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APRIL 19, 1961

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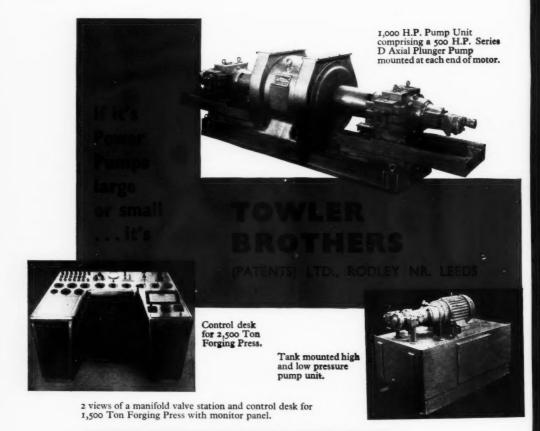
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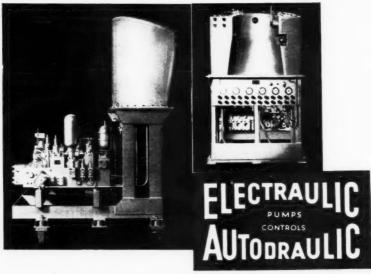
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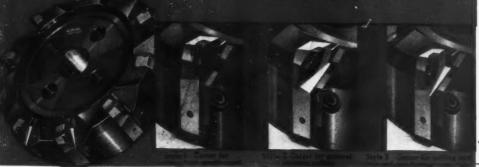


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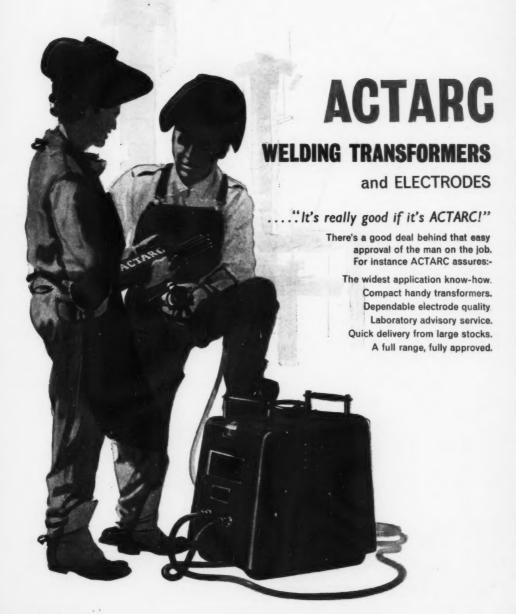


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The little moon we are standing on is only ten miles in diameter a chunk of rock roughly twice the size of Mt. Everest. Its gravity is so weak that a man in any sort of condition whatsoever could easily leap off into space.

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A grouping of "Spin-Top" Flameproof Combination Starters at an American Oil Refinery.



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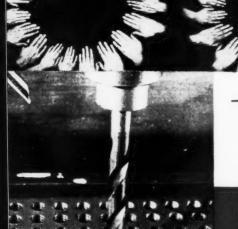
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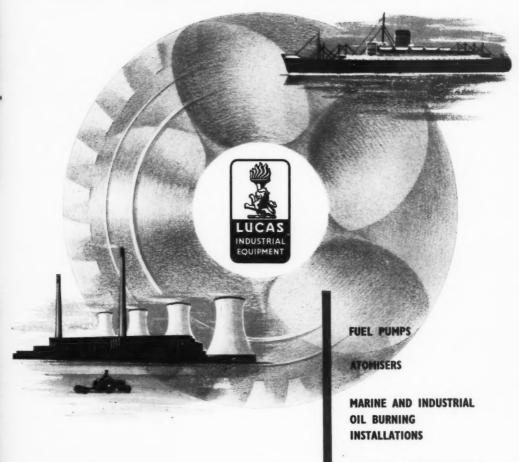
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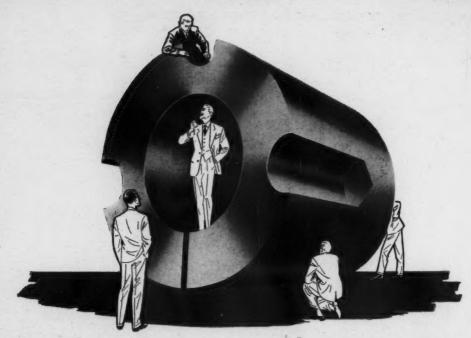
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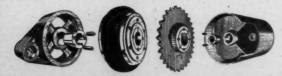
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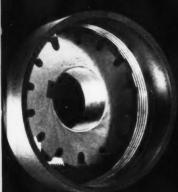
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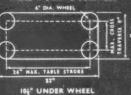
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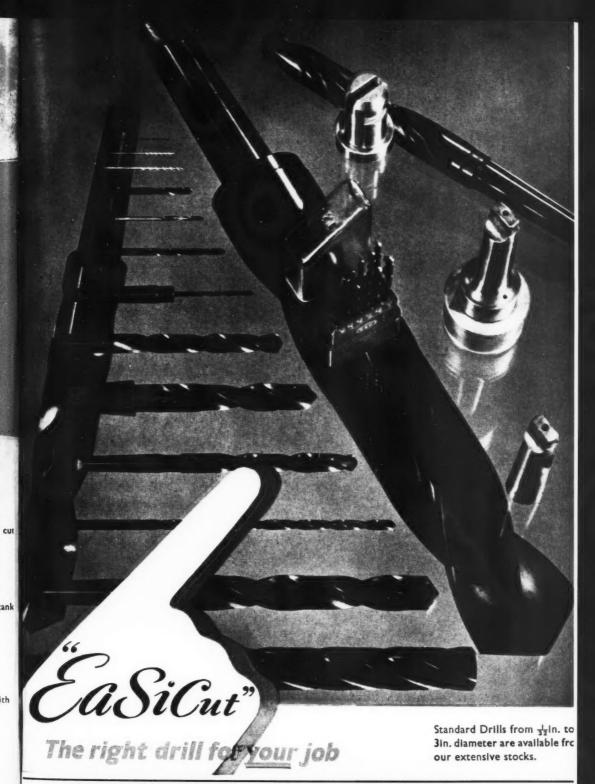
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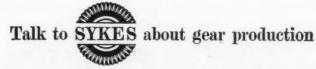
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MACHINERY



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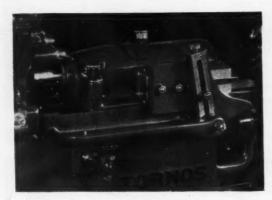
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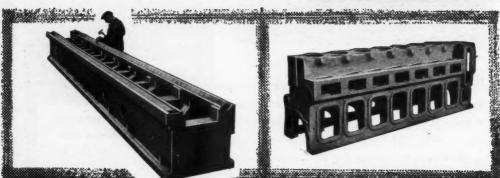
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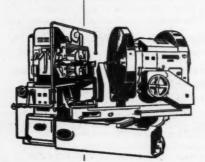
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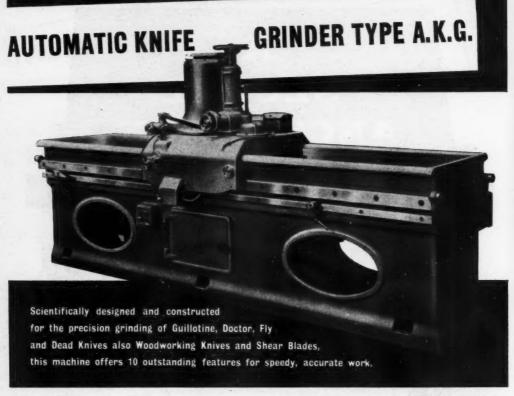
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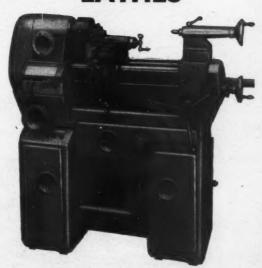
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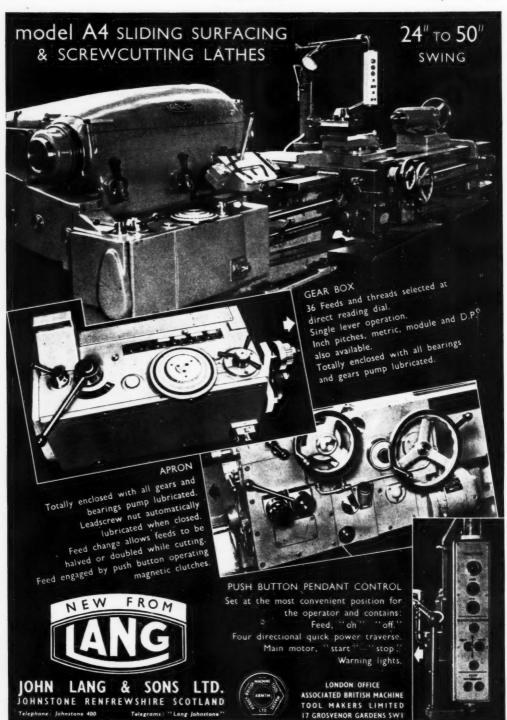
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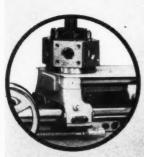
DOUBLE - SLIDE CAPSTAN LATHES



0.4% C. STEEL

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The New DOUBLE-SLIDE allows heavier work with higher rates of removal and provides Greater Rigidity and Accuracy



Throughout the whole of its forward movement. the hexagonal turret is supported underneath by a sliding bridge which is in direct contact with the bed on all its working surface. This ensures correct alignment at all times, whatever weight of tools the turret carries

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Bar Capacity with Standard Spindle with oversize Spindle

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SPECIFICATION

WORKING SURFACE OF TABLE 54 in. x 16 in. HEIGHT ADMITTED BETWEEN MIN. 1/ in. SPINDLE NOSE & TABLE MAX. 24 in. DISTANCE FROM CENTRE OF SPINDLE 18 in.

TO FACE OF COLUMN SPINDLE ADJUSTMENT SPINDLE DRIVING MOTOR SPINDLE SPEEDS: up to 1400 r.p.m.

THREE OPTIONAL RANGES OF IS SPEEDS

RANGE 1. 20 TO 1000 r.p.m. RANGE 2. 25 TO 1250 r.p.m. RANGE 3. 32 TO 1400 r.p.m. up to 63 ins./min. TABLE FEEDS: FOUR OPTIONAL RANGES OF 16 FEEDS

RANGE I. 8-8 TO 25 ins./min. RANGE 2. 1-18 TO 37-5 ins./min.

RANGE 3. 1-6 TO 50 ins./min. RANGE 4 2 TO 63 ins/min.

100 ins./min. TABLE RAPID TRAVERSE

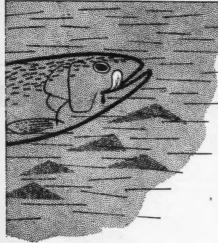
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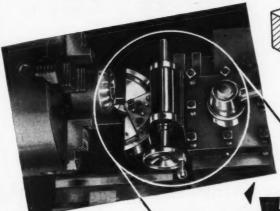
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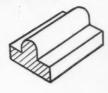
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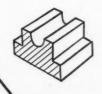
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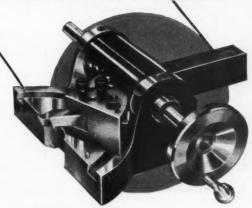
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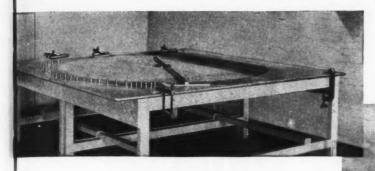
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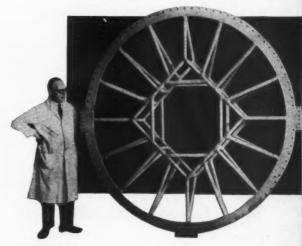
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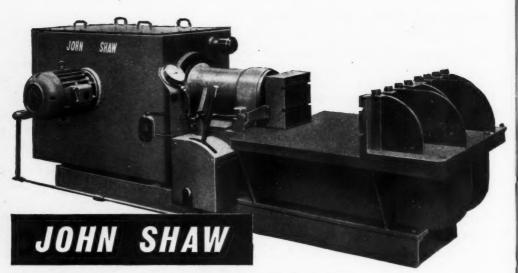
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OA/6672

This is the latest develop ment in the range of LUMSDEN Reciprocating Table Machines. Its design

retains the double column support for the bridge, but the columns have been angled to provide easier access to the table. Other improvements to be found on

TYPE 71 MLOD include an improved feed arrangement for the wheel and the incorporation of power elevation for rapid movement of the grinding head. Hydraulic controls of new design have been repositioned to give easier operation. Lubrication of the entire machine is fully automatic, with special provision for the table ways which now have 100 per cent. protection. The spindle motor is mounted inside the bridge, from which new position its drive is transmitted to the spindle through a Power Grip belt.

Control equipment for the motors is now housed within the column and the push button station, which includes controls and signals for the magnetic chuck, is mounted within easy reach of the operator. Both rectifier and

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Reciprocating Table

SURFACE

Type 71 MLOD



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THE LUMSDEN MACHINE CO. LTD. GATESHEAD, ENGLAND SOLE AGENTS: ALFRED HERBERT LTD. COVENTRY

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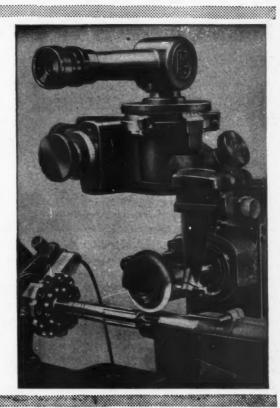
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for wheelforming under optical control without template

The unit is permanently attached to the head of the machine. One radial and two tangential straight line motions can be carried out in one setting. Additional wheel dressings are undertaken by operating the micrometer controlled cross slides, thus permitting the dressing of intricate profile combinations along the periphery of the wheel. The microscope facilitates quick and accurate diamond settings and the checking of the grinding wheel after dressing. Commercial diamonds employed since the radial dressing motion is viewed against a graticule.



Patent Pending on No. 36115/58













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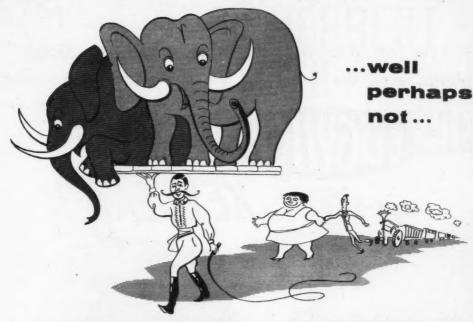
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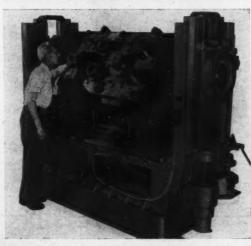




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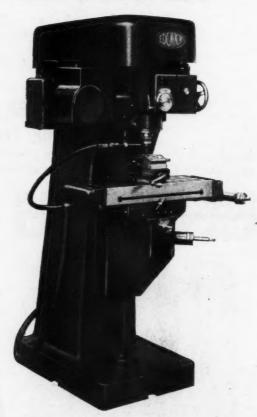


This machine is designed to generate a keyseat by the well-known principle of a series of light cuts with a reciprocating cutter slide and a sequence down-feed.

On general toolroom work the machine can be used to advantage as a light hand-feed vertical milling machine.

Max. keyway cut, auto crank drive and table adjustment, \(\frac{1}{4}\)" x 20". (at one setting of the table \(\frac{1}{4}\)" x 5").

Max. depth of keyway cut, automatic, 23".



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for drilling holes the human eye can hardly see, up to 1/8" diameter.

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The Herbert Type "B" Drilling Machine is a bench-type single or multi-column machine. Six speeds, maximum 18,000 r.p.m. Stroke 1 5/8", radial capacity 4 3/8".

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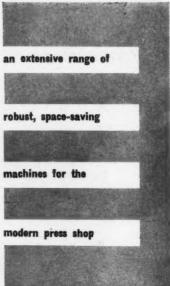
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EXCLUSIVE FEATURES

- I. Forged Steel interchangeable Diehead, wear resistant to ensure a long and accurate life.
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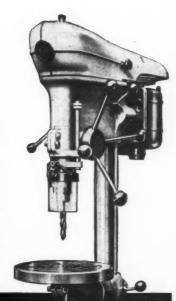
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KERRY ¾ INCH CAPACITY SUPER "8" SPEED DRILL

A production and general purpose jobbing machine, robustly constructed to ensure absolute reliability under the most arduous operating conditions. Features that have made this Super "8" so popular include a wide speed range—from 86 to 3,360 r.p.m. or 45 to 2,000 r.p.m. and adaptability for such applications as drilling, reaming, tapping, trepanning, etc. Tens of thousands are in use throughout industry today. The Super "8" is available as a bench, pedestal or line production model together with a complete selection of attachments for special application.





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A ½ inch capacity production drilling machine designed for continuous operation over long periods. The "Drillmaster" can be supplied with a low, standard, or high speed range to suit customers' requirements. Each model has 4 spindle speeds ranging — in the low speed machine from 300 to 2,200 r.p.m.— the standard from 617 to 3,360 r.p.m., and the high speed machine up to 7,000 r.p.m. Bench, pillar and line production models are available in the above speed ranges.

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This lathe will swing up to 6 ft. over the saddle and is specially designed for Turning Drums, Rollers, etc. It is easy to handle, economical in operation and competitively priced. The Big Swing also makes this an ideal machine for general maintenance work.

The 0 & S Big Swing Lathe incorporates all these features:

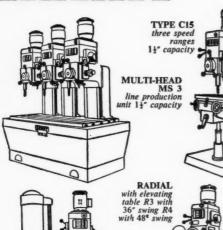
- Up to 6 ft. swing over saddle
- Up to 25 ft. between centres
- 12 spindle speeds
- Large hollow spindle
- Spindle bearings PB or Taper Roller
- 32 enclosed change feed and screw-cutting box
- Long lead cutting gear
- Quick power motion to
- Power feed to compound top slide if required
- Power feed to loose headstock if required
- 30 or 35 H.P. motor drive

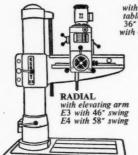


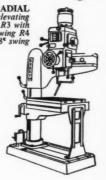
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RANGE OF LING MACHINES

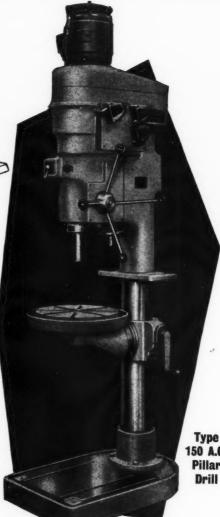






The Kerry 150 A.G. is a versatile, heavy-duty Pillar Drill at a reasonable price which will give long and reliable service under hard working conditions. This 1½" capacity all-geared model has 9 spindle speeds from 85-1,050 r.p.m., 3 ratios of power feeds and reverse to spindle for tapping. The table may be revolved 360° or swivelled to 90° either way for angular drilling. The 150 IV. model is infinitely variable, with similar capacity and specification. These are just two of the wide range of Kerry Bench, Pillar and Line production models with drilling capacities from 1" to 11"-all first-class machines for their respective applications.

Full details from your Machine Tool Merchant or our Sales Office



150 A.G. Pillar Drill



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SAWMASTER TYPE 10 B AUTOCUT HEAV Y-DUTY BANDSAW

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Infinitely variable cutting speeds, accurate blade guidance, faster cutting times, power lifting and lowering of sawframe, simplicity of operation and of blade changing mean higher production than with any comparable saw. The completely automatic cutting cycle facilitates repetition work.

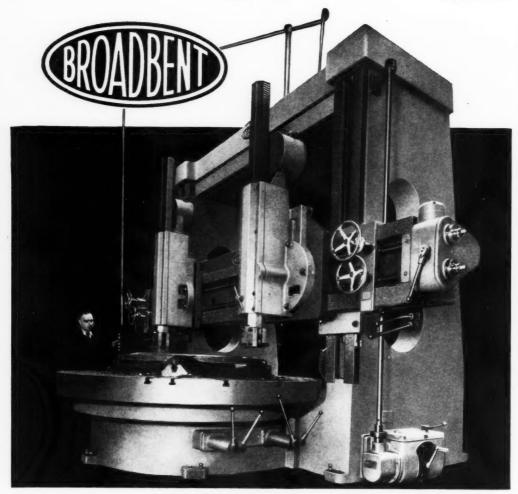
the British made Bandsaw that is in the world's top class

-and the famous SAWMASTER Power Hacksaws 6" 8" 10" or 12" capacity



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HEAVY DUTY Vertical BORING & TURNING MILLS

with 5. 6. 8 or 10 ft diameter work tables

These incomparable machines are massively constructed for years of hard service. Accuracy and dependability are of the high order that industry has learned to expect of Broadbent Machine Tools. Notable features of these Boring and Turning Mills include twelve changes of speed and six changes of feed, controllable from either side of the machine; spiral bevel and spur reduction gears driving the work table; pendant control of rams and cross slides; and rapid power traverse with independent control of the two heads.

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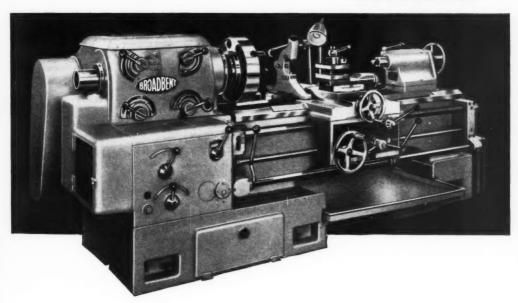
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Good men plus good tools equal good output. Every Broadbent lathe incorporates almost a century of machine tool building. Manufacturers know that for versatility, accuracy and reliability there is nothing quite as good as a Broadbent Machine Tool.





This 18/22" Swing Heavy Duty Centre Lathe of modern design is a typical example of the Broadbent range. It has a 15 h.p. drive motor and spindle speeds up to 1,000 r.p.m.

The Broadbent range of Machine Tools includes Surfacing and Screw-cutting Lathes from 17" to 72" swing, Surfacing and Boring Lathes, Break Lathes, Crankshaft Lathes and vertical Turning and Boring Mills with 5', 6', 8' or 10' capacity.



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11" SWING LATHES

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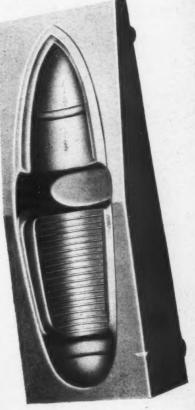
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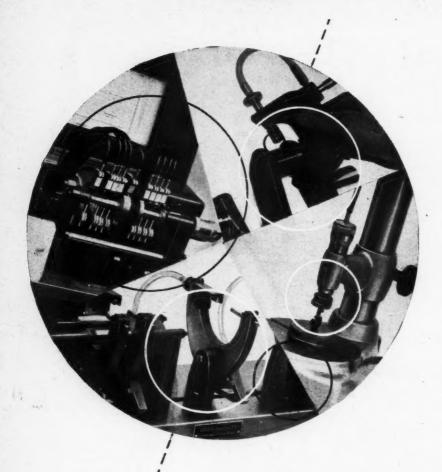
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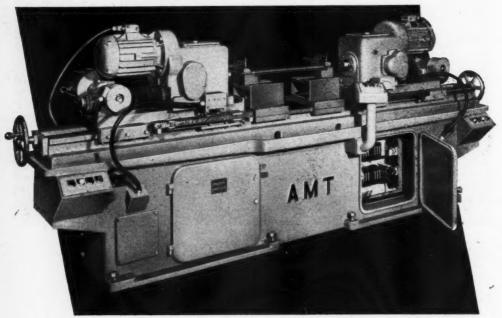
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ANOTHER EXAMPLE OF



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INCORPORATED INTO A VERSATILE 2-WAY DRILLING MACHINE -



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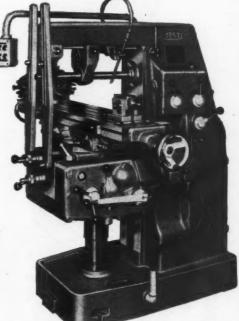
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Table Feeds:	Longitudinal	ace)	29in.
	vertical		17‡in.
Spindle:	Spindle Nose 18 speeds	••	No. 40 N.S. 40 to
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Vertical Milling Attachment Arbor, Front Braces Coolant Equipment etc.

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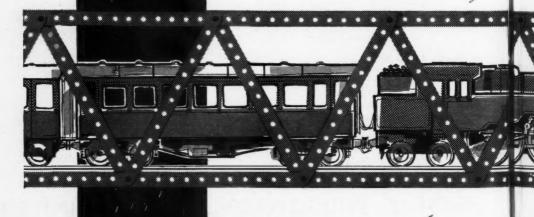
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keeps MECCANOr

There are some names we learn in our boyhood choo that never lose their magic—and Meccano is one of Live them. Today, this name, so intimately connected coal with enamelled pieces of steel strips and plates that other made every youngster a constructional engineer less. has an even wider appeal. Together with Hornby keep trains—electric and clockwork—Dinky Toys and gener Bayko, Meccano now provides a quartet of delight for boys and girls—and their fathers! fuel 1

The far-sighted management that has kept build Meccano a best-seller shows the same sound and y judgment when dealing with grown-up affairs, like

PROGRESSIVE INDUSTRY IS GOINGFOR



Norunning like clockwork

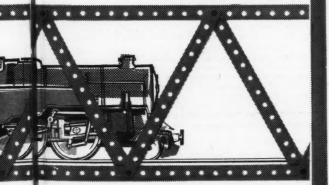
oyhood choosing *coal* to fuel its great powerhouses at sone of Liverpool and Aintree. Coal was chosen because nnected coal provides more heat for the money than any other fuel. Coal, mechanically stoked, is smokengineer less. And in our coalfields there is enough coal to Hornby keep British industry going at top production for one one of the stokes of the stokes

When you are required to make a decision about fuel remember Meccano. Coal has helped them to as kept build up a model industry. Choose the same fuel—sound and you've made the most constructive start.

OING FORWARD ON

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COAL



ISSUED BY THE NATIONAL COAL BOARD

Coal Provides
the Power
at Meccano's
factory at
Binns Road,
Liverpool



Mr. Gibbs, Chief Engineer, comments:

"We at Meccano operate all power and steam process equipment from coal.

The present boiler plant consists of two water tube boilers and economisers fitted with usual mountings, including feed water regulators. These boilers were installed in 1928 and still give us a first-class service today. Their efficiency is high.

Since the original installation we have continued to make improvements. In 1948.

Since the original installation we have continued to make improvements. In 1948 further instruments were added, such as CO₂ recorders and indicators and flue gas temperature recorders. A feed water meter was installed in 1955 and soon afterwards a smoke indicator and recorder. More recently the reciprocating feed pumps have been superseded by electrically operated centrifugal pumps.

In this way we have kept pace with the increasing demands of production and made the best use of all our equipment.

Firing is by chain grate stokers and all fuel is handled mechanically. Steam is used for space heating and process work.

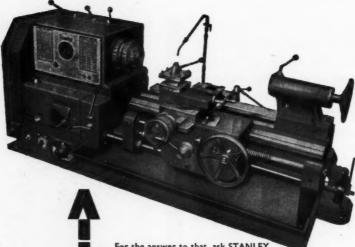
Each boiler is opened up for cleaning and inspection once a year. The flues are easily cleaned with a compressed air line, and on completion the boilers work for the following year with practically no maintenance.

completion the boilers work for the following year with practically no maintenance. Coal is obtained from a local colliery and deliveries are arranged daily to suit our requirements. The quality of the coal is always consistent and we are confident that we shall continue to use coal for years to come."

Here are some key facts and figures about the consumption of coal at Meccano:

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The new Stanley is heavier—has greater horse-power—a wider bed —totally enclosed, built-in electrics. It can be supplied with a back turning rest to turn large diameters the full length of the open gap. The Stanley Sliding Bed Lathe is really two lathes in one. It can be used as a standard centre lathe and also for large diameter, large width jobs which would otherwise call for a special machine.

Stanley lathes have been serving satisfied users all over the world for more than twenty years. The new model is designed and built to carry on this fine tradition.

All you want to know about the improved Stanley Sliding Bed Lathe is contained in a new catalogue—sent on request.

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MAHO MH.800. Table 31½" x 12½", horizontal spindle speed 32 - 1320 r.p.m., vertical spindle speed 45 - 1900 r.p.m.

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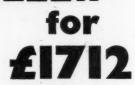






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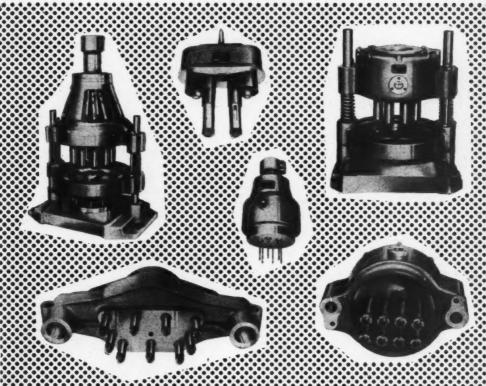
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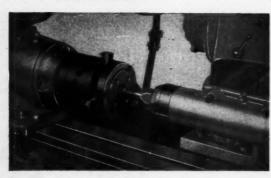
UNIVERSAL TRIGRINDING MACHINE

MODEL No. 810

SURFACE GRINDING

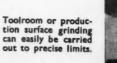
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The machine can be rapidly adapted for internal grinding as shown.





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On the right can be seen a typical arrangement of cutter blades on the table of a Snow Surface Grinding Machine.





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for continuous and accurate production

Fourteen of these vertical surface grinding machines are installed at the Tenbury Wells factory of Richard Lloyd Limited, and as shown in the close-up view on the right they are extensively used for rough grinding cutter blades for the well-known range of "Galtona" Serrated Blade Cutters.

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Built in a range of sizes with table working surface 32in. by 10in. up to 180in. by 20in. and height, table to wheel, 12in. to 24in. Write today for a catalogue describing the Snow V type range.

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DRILLING MACHINES

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CAPACITY UP TO \$\frac{1}{1}\text{.in.}\$ sensitive

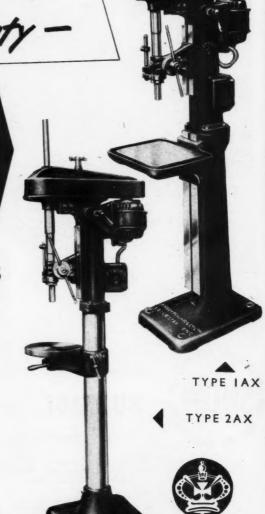
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MACHINERY

April 19, 1961

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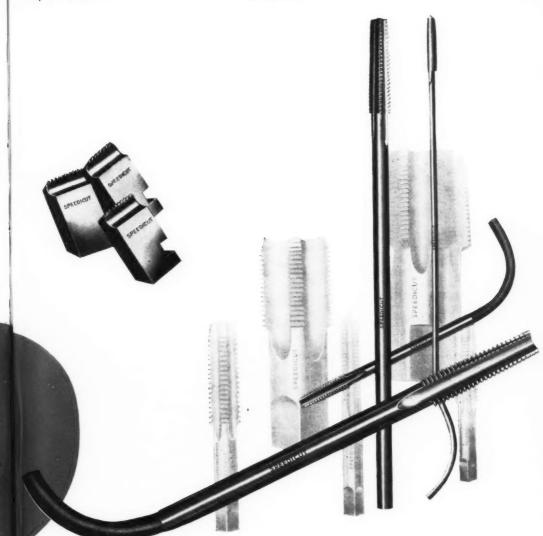
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Wheel diameters from Eight to Twenty Inches



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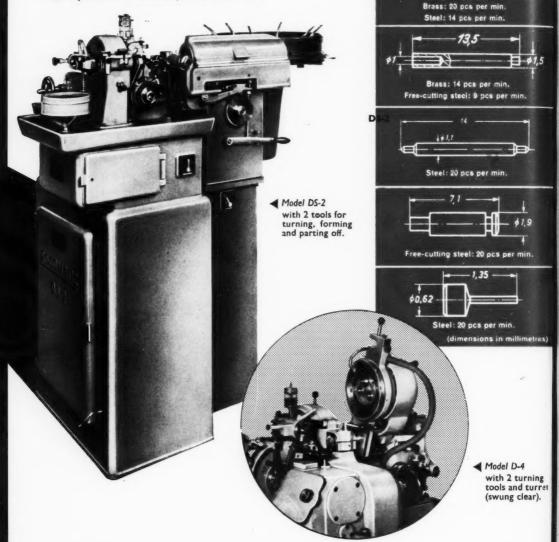
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Model DS-2 and D-4 Coil-Fed Automatics

for greater efficiency in the production of small turned parts up to $\frac{5}{32}$ in. dia., through

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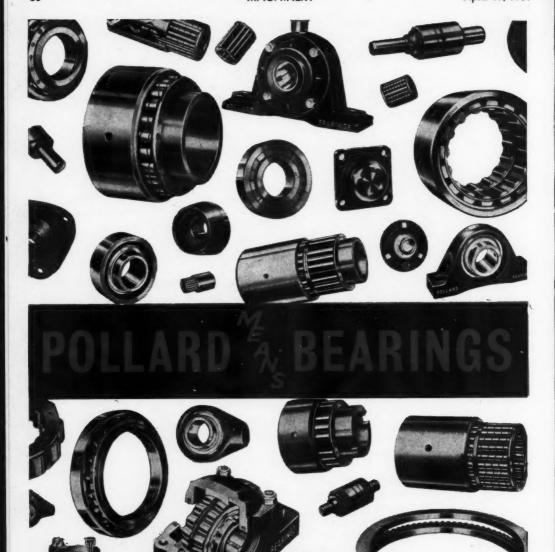
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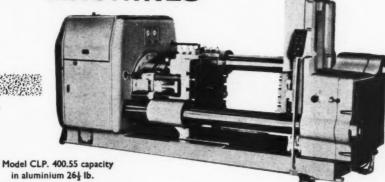
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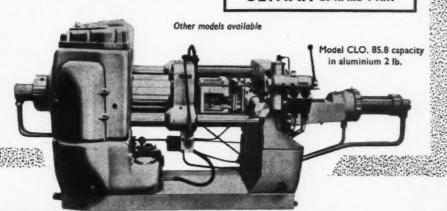
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Sectionized Transfer-matic Introduces New Concepts of Processing 4-Cylinder Blocks

A significant forward step in automation has been achieved by a new Cross Transfer-matic which integrates all operations except broaching that are required to finish cylinder blocks of three different horsepower capacities. The multiplicity of operations in a single machine and the fact that the entire line was created by one builder result in large reductions in engineering, materials handling, control circuitry and

The new Transfer-matic consists of six sections with a total of 121 stations. Three banking conveyors are provided between appropriate sections.

In Sections I and II, most of the

heavy metal removing operations are handled. These include straddle milling the main bearings, milling the oil slinger grooves, rough drilling the valve lifter holes, rough boring the cylinders, rough boring the camshaft and milling the ends of the block.

In Section III, the sides are completely machined and the accessory and

engine mounting pads are milled.

In Section IV, the operations on the top and bottom of the part are performed and the valve lifter holes are finish machined. A special coolant system is employed.

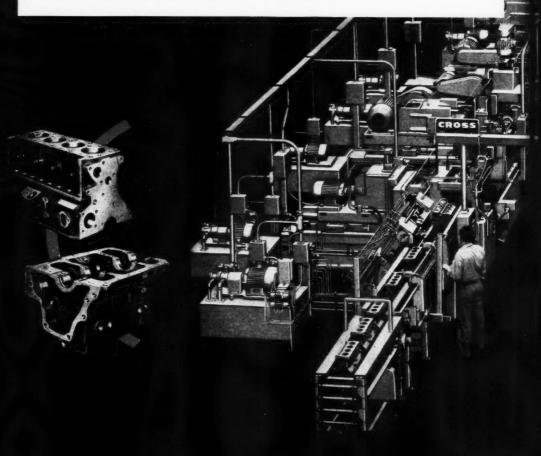
In Section V, the block is washed

and the bearing caps are assembled.

In Section VI, the cam and crank boring operations and inspections are completed.

At 100% efficiency, production is at the rate of 109 blocks per hour.

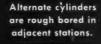
A Cross sales engineer would like to acquaint you with features of this Transfer-matic in detail.

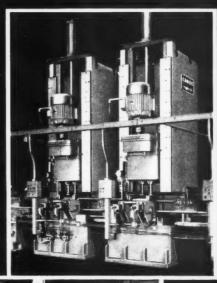


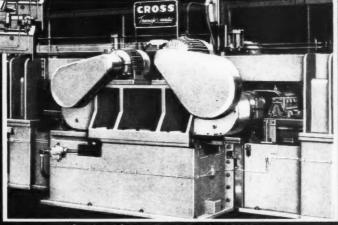












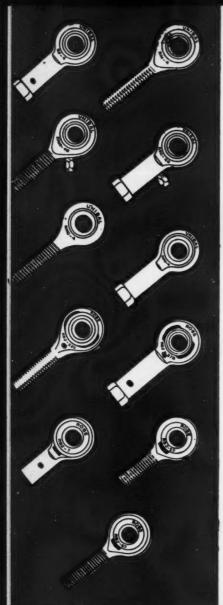
Rough and finish milling both ends of the block.

CROSS INTERNATIONAL A. G.

P. O. BOX 300 • FRIBOURG, SWITZERLAND
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There is bound to be a rod end or spherical to suit your application.

Most of these units may be released by our own A.I.D. or A.R.B. inspection organisation.

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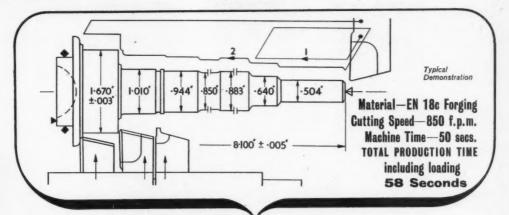
Full dimensional details are given in the catalogue obtainable free of charge upon application to

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Bearings Division, Gainsborough, Lines

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Auxillary plunge cut toolholder.



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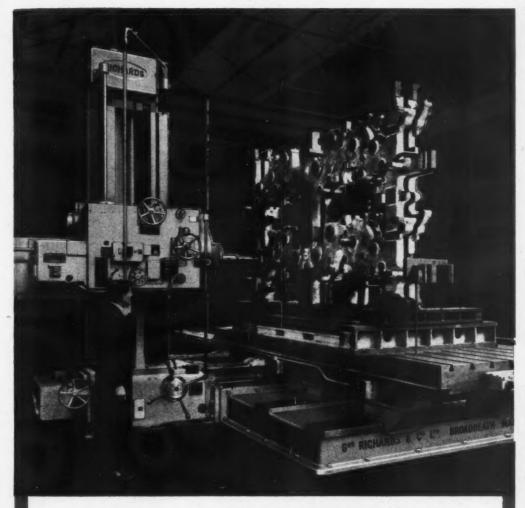
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Further details of any of the wide range of Richards Machines are given in pamphlets, copies of which will be gladly sent on request. Illustrated above is a Richards Wide Bed Type Horizontal Boring, Facing and Milling Machine, with Traversing Spindle, in plant at the Preston works of the Goss Printing Press Co. Ltd. The machine is shown boring and facing the side frames of a printing machine, and has an 18ft. Oin. wide bed, a 15ft. Oin. by 6ft. Oin. sliding table, fitted with optical scale projectors.

wide bed, a 15tt. Uin. by bit. Uin. sliding table, fitted with optical scale projectors.

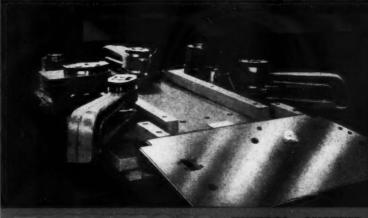
The machine is representative of a full range of Horizontal Boring, Facing and Milling Machines, which include Table, Wide Bed, Saddle Support, Floor and Planer types, supplied with and without traversing spindle. The range can be further increased with combinations of extended height, bed length and width, and table size if required.

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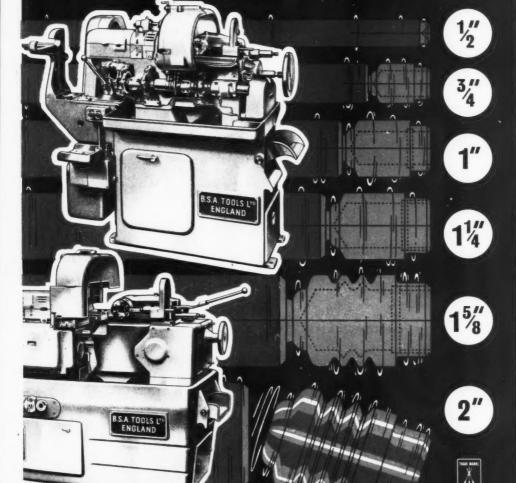
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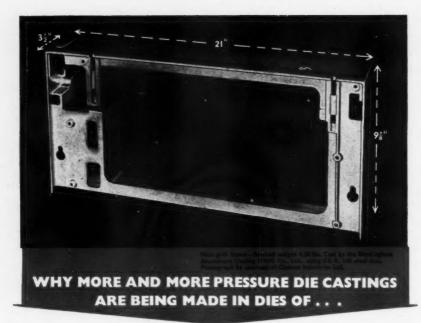
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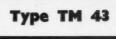
4 Pembridge Mews, Notting Hill Gate, W.11, Telephone: BAYswater 9131/2
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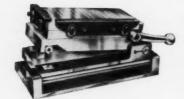
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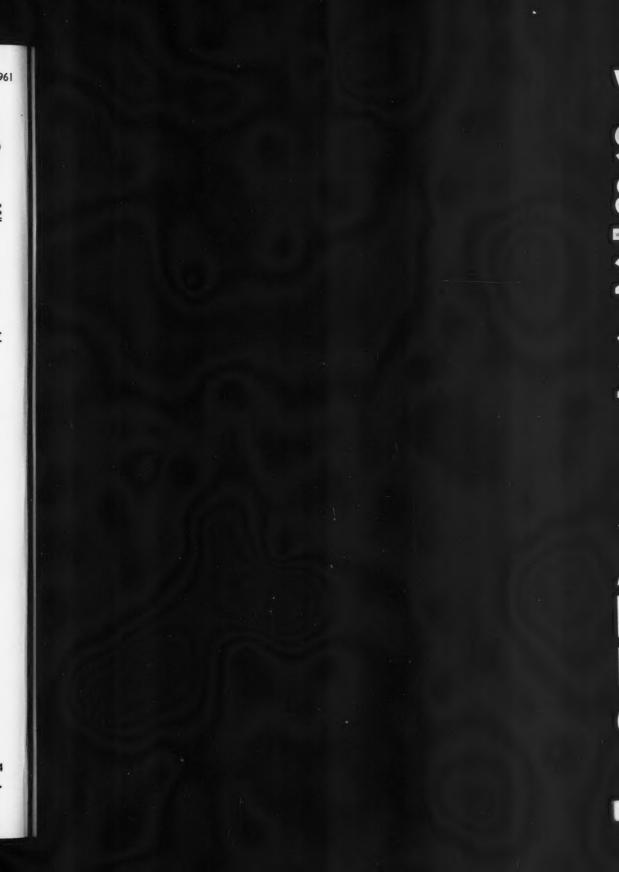
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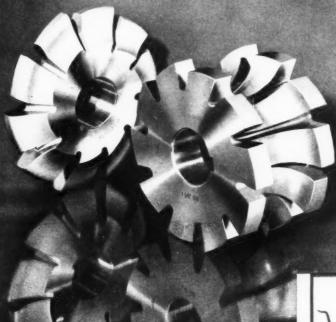
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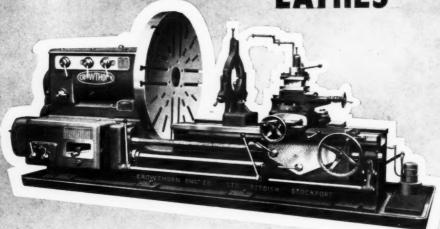
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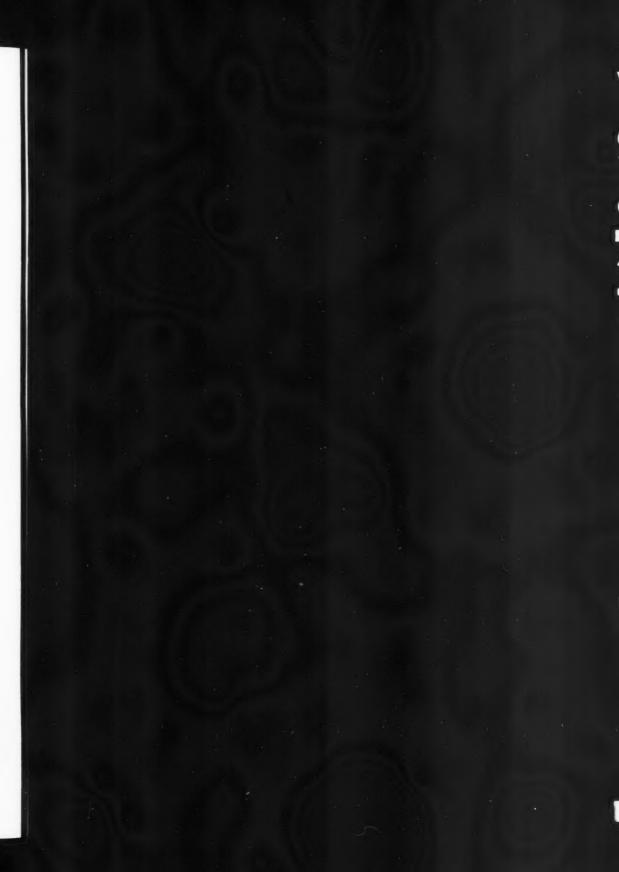
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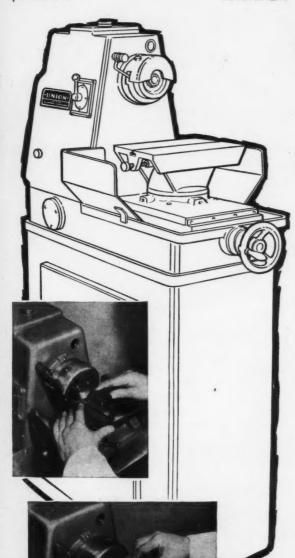
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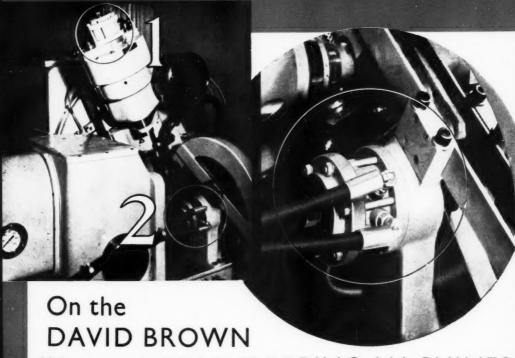
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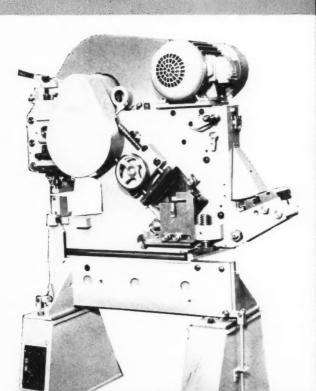
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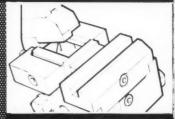
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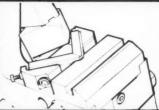
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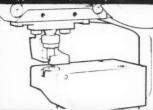
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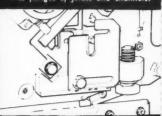
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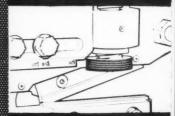
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WITH HYDRO PNEUMATIC TABLE DRIVE

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Works on standard air line pressure

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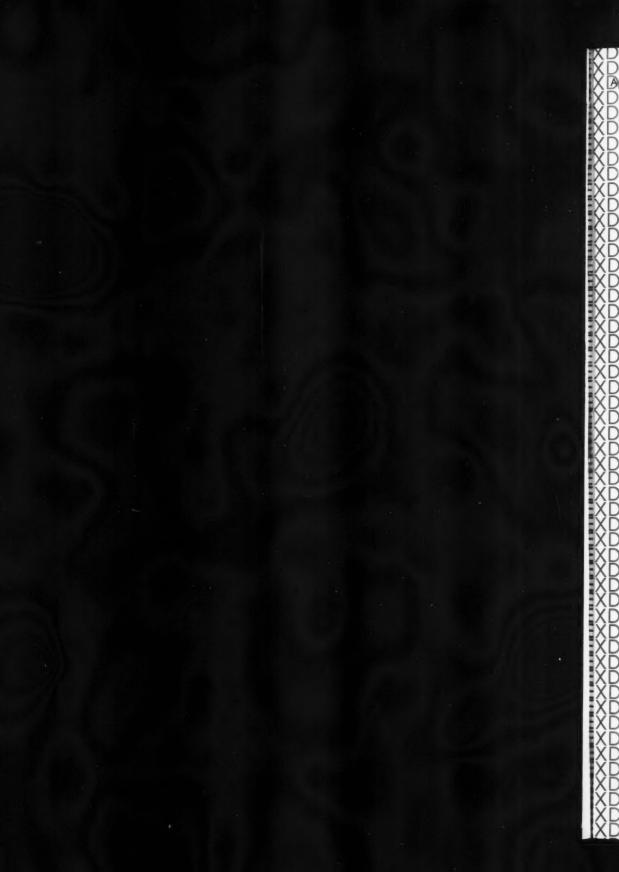
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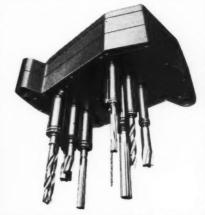
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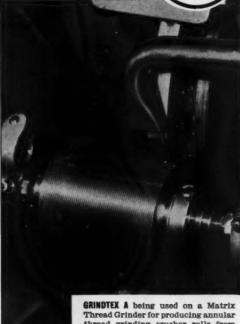


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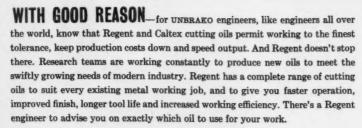


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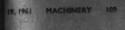
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MODERATELY

ask for publication 139/59



Automation Head

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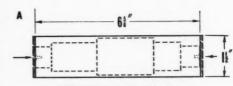
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A JOURNAL OF METAL-WORKING PRACTICE & MACHINE TOOLS

Vol. 98, No. 2527

April 19, 1961



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Abstracts of Principal Articles

Sewing Machine Production in Japan P. 80

The second of two concerned with the production of sewing machines in Japan, this article describes some further operations on arm castings for domestic sewing machines at the Wakayama factory of the Mitsubishi Electric Manufacturing Co., Ltd. Linereaming of the crankshaft bores is performed on an adapted lathe, and milling operations are carried out on plain horizontal machines, one of which has been fitted with a right-angle head made by the company. Certain drilling operations are performed on a 4-way machine with standardized unit heads and an airoperated clamping fixture, and an 8-spindle machine on which the table is fed upwards hydraulically. Needle-bar holes are reamed on another adapted lathe which is also employed for tapping and reaming the holes for the pressure bar. Super-finishing operations on shafts are carried out on a companymade centreless machine, and lathes with suitable attachments are employed for super-finishing bores. (MACHINERY, 98-19/4/61.)

Producing Small Parts from Sheet Metal by Etching P. 876

Small sheet metal parts for such equipment as computers, missile guidance systems, and electronic apparatus are being produced by the Chemical Micro Milling Co., U.S.A., by processes developed by the Beck Engraving Co., U.S.A., with whom they are associated. A greatly-enlarged drawing of the part required is produced, and is subsequently reduced photographically to the actual size. Multiple images are made, and the parts are etched from the sheet of material by means of a ferric-chloride bath. Full details of the process are included in this article, as well as examples of typical workpieces produced. (MACHINERY, 98—19/4/61.)

Large Fromag Keyseating Machine P. 879

Automatic Copy-turning of Gearbox Mainshafts P. 880

New plant recently installed by Vauxhall Motors, Ltd., Luton, for operations on mainshafts for gearboxes includes a Churchill-Redman type P.5 copyturning lathe. This machine is employed for roughing out the shafts, on three diameters, and is equipped with fully-automatic loading and unloading devices. An automatic gauging head is incorporated which advances to probe one of the turned diameters at the end of each cycle. When this diameter is 0.003 in in excess of the specified size, indicating that the tool requires to be changed, the machine is automatically stopped and a signal lamp is illuminated. (MACHINERY, 98—19/4/61.)

Inert-gas Tungsten-arc Spot-welding for Missile Assemblies P. 886

Investigations concerned with the spot-welding of missile components by the inert-gas, tungsten-arc method have been undertaken by the Convair (Astronautics) Division, General Dynamics Corporation, U.S.A. The investigations covered materials with total thicknesses ranging from 0·02 to 0·1 in., and it was found that consistency, reliability, and reproducibility of the tungsten-arc spot welding process, were comparable to those obtainable with resistance welding. Tests were made with electrode shapes ranging from a needle point to a $\frac{3}{32}$ -in. diameter flat-ended type. It was found that cleanliness of the mating surfaces and intimate contact between the materials to be welded was essential for good joints, and that the use of copper as a back-up material offered advantages. (MACHINERY, 98—19/4/61.)

Norton Press Demonstration .. P. 890

At a recent demonstration at the Engineering Centre, Birmingham, emphasis was laid on the use of the 7½-ton high-speed hydraulic press built by Norton Tool Co., Ltd., Horley, Surrey, for shaving operations. The hydraulic circuit for this machine provides for reciprocating the ram continuously, at rates as high as 1,800 strokes per min., while the work is pushed through the die, so that a cutting, rather than a shearing, action takes place. With this arrangement, it is stated that a high degree of accuracy is obtained. MACHINERY, 98—19/4/61.)

Contributions to MACHINERY

If you know of a more efficient way of designing a tool, gauge, fixture, or mechanism, machining or forming a metal component, heat treating, plating or enamelling, handling parts or material, building up an assembly, utilizing supplies, or laying out or organizing a department or a factory, send it to the Editor. Short comments upon published articles and letters on subjects concerning the metal-working industries are particularly welcome. Payment will be made for exclusive contributions.

EDITORIAL

The Economic Survey

Attention was recently drawn in Machinery to the statement in the P.E.P. publication "The Promotion of Economic Growth" that the rate of economic expansion in the United Kingdom, in relation to the population, had recently been only about 2 per cent per annum, and had been exceeded in almost all the other European countries. This statement, so far as it concerns the rate of growth in this country, is confirmed in the 1961 Economic Survey* which has lately been issued. Commenting on the situation, the Survey then indicates that the Government "recognize the desirability of having a higher and steadier rate of growth, provided that this can be done without risk to the balance of payments, in order to encourage the sense of security and confidence in the future which are so important for business development."

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Contributions towards this end have been made, it is contended, "by the Government's policy of maintaining a high and stable level of employment, together with their policies designed to stimulate investment." Much, however, "will depend upon the determination of industry to adapt itself to changes in demand, to make greater use of facilities for education and training at all levels, and boldly to plan investment for increased production and reduced costs. It will not be possible to expand production, increase exports, and maintain full employment, without the fullest co-operation of employers and workers, individually and collectively, in the introduction of new plant and methods, and in ensuring that increases in incomes are not such as to raise the general level of costs."

This belated emphasis upon the importance of investment "for increased production and reduced costs" is most welcome, as is the statement in the Survey that, following a substantial increase in 1960, "private investment is likely to rise sharply in 1961, mainly as a result of a further large increase in capital expenditure by manufacturing industry." In this connection it may not be inappropriate to recall, once more, that, largely as a result of Government policy, machine tool deliveries in 1958 fell by more than £11 million, and in 1959 by more than £16 million, in comparison with 1957, and that over the 2-year period there was, simultaneously, a net decline of more than £23 million in the value of orders in hand.

During these years, moreover, there was very substantial growth in the outputs of domestic refrigerators and washing machines, television sets, and private cars, for example.

Accepting the implication of the Survey that deliberate discouragement of investment in more effective plant and equipment is now a thing of the past, however, it appears that very heavy demands will be made on the machine building industries, including the machine tool industry, at least for some years to come. This latter industry, for example, which was operating well below capacity in 1959 for lack of work, booked orders last year which exceeded deliveries by some £50 million, with the result that delivery periods for many firms have inevitably lengthened substantially. If past deficiencies as regards re-equipment in British industry are to be made good within a measurable period, the potential requirements are very large. At the same time, the machine building industries are being called upon to contribute a larger and larger share of our total export trade.

It is emphasized in the Survey that any substantial improvement in the balance of payments can only be brought about by an expansion of exports, which will depend "in part on the level of world trade, but much more on competitiveness in prices and the maintenance of deliveries, as well as on initiative in expanding existing, and develop-ing new, markets." With reference to these remarks, it may be pointed out that in 1955 the value for the export group "machinery other than electric" was £460 million or 15.8 per cent of the total for all exports in that year. By 1960, the corresponding figures had increased to £711.8 million and 20.1 per cent. Regarding the situation from another standpoint, exports of machinery (ignoring changes in the value of the £) increased by nearly 55 per cent during the 5-year period, whereas for all exports the rise was less than 22 per cent.

If exports of "machinery other than electric" continue to expand at the same rate they will reach a value of about £1,100 million in 1965 (at 1965 prices), but in view of the disappointing results for exports under many other headings, such a total may be far from sufficient. At the same time, it will be necessary to ensure, if British industry as a whole is to retain even its existing

⁽Continued on page 917)

Sewing Machine Production in Japan'

Methods Employed by Mitsubishi Electric Manufacturing Co., Ltd., Wakayama

By R. E. GREEN, Associate Editor

IN AN EARLIER ARTICLE, brief reference was made to the history and the present position of the sewing machine industry in Japan, and of one of the larger firms engaged in that industry—the Mitsubishi Electric Manufacturing Co., Ltd. Some of the machines and methods employed for operations on sewing machine arm castings were also described, and further stages in the production of arms are here considered, also some special machines employed for super-finishing sewing machine components. Straight-stitch sewing machines, of conventional design, in which iron castings are employed for the arm and base, form the greater part of the output of the Mitsubishi factory, which is at Wakayama, some 35 miles from Osaka.

An arm casting is seen undergoing inspection in the heading illustration, and is of conventional design with bores for the crankshaft, needle- and pressure bars. Rough- and semi-finish machining operations on the crankshaft bores were described in the previous article, and at the next stage the bores at the column and needle-bar ends of the casting are line-reamed to diameters of 18 + 0.021 0.000, and 28 + 0.025 - 0.000 mm. (0.708 +0.0008 - 0.000, and 1.1024 + 0.001 - 0.000 in.), respectively. Reaming is carried out on the adapted Teimitsu lathe (made by a company no longer active in this field) shown in Fig. 1, on which



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auxiliary bed-ways of weld-fabricated, built-up construction, have been provided.

Of dovetail form, these bed-ways serve to support and guide a sliding fixture which is moved manually, by means of the capstan shown, through rack and pinion. Nest-type locations are provided for the casting, and it is clamped, with the column end in contact with a vertical face on the far side of the fixture, by a screw. The casting is also thrust towards the right by a small screw, tightened by a spanner. The line reamer, of high speed steel, is held in a floating coupling on the spindle of the lathe, and is driven at a speed of 65 r.p.m., while the casting is fed by hand.

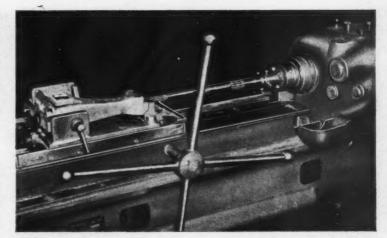
INTERNAL MILLING OPERATIONS

A flat mounting surface for the stitch-regulating lever is next milled on an internal projection within the column-end of the casting, on the horizontal machine shown in Fig. 2, which was built by the Enshu Machinery Industrial Co., Hamamatsu. The casting is held in a vertical position, with the column-end upwards, in a cast fixture, which provides locations for the machined faces at the lower, needle-bar end, and has a vertical face to receive the column base. A screw clamp is applied to the outer crankshaft boss by means of the lever which the operator is holding in Fig. 2, and also serves to hold the column base against the vertical face of

A long end milling cutter, of about 1 in. dia-

*Articles on the Japanese metal-working industries which have already been published in Machiners have been concerned with the 4th Osaka International Trade Fair, 96/1212—1/6/80 and 96/1288—8/6/80: Motor Car Production in Japan, 96/1242—15/6/80, 96/1552—22/6/60 and 96/1640—29/6/60; Bicycle Production in Japan, 97/460—67/760; Refrigerator Production in Japan, 97/460—25/7/60; Refrigerator Production in Japan, 97/460—25/7/768—28/9/60, 97/1276—7/12/90 and 97/1448—28/12/90; Television Receiver Production in Japan, 97/932—26/10/60; Transistor Production in Japan, 98/263—1/2/61; Sewing Machine Production in Japan, 98/468—1/3/61, 1. Regai Iron Works, Ltd., 97/304—10/8/60, 2. Okuma Machiner Works, Ltd., 97/263—21/9/60, 4. The Kawasaki Works of Hitachi, Ltd., 97/1048—91/1/60, 5. Mitsui Precision Machinery & Engineering Co., Ltd., 98/408—15/3/61, 7. Shibaura Machine Co., Ltd., 98/769—5/4/61.

Fig. 1. Line-reaming of the two bores for the crankshaft in a typical arm casting for a Mitsubishi domestic sewing machine is performed on this lathe, which has been converted by fitting an auxiliary slide



meter, is mounted on the machine spindle, which is driven at 330 r.p.m., and the saddle is first traversed towards the cutter to bring the casting into the milling posi-

ing into the milling position. Next, the table is fed sideways by hand for a short distance, for milling the face.

A second milling operation is performed on a similar machine, seen in Fig. 3, which has been equipped with a right-angle adapter made by the company. In the fixture, the casting rests on machined faces on one side, and clamping force is applied in three directions by means of two screws, and a lever-type clamp near the needle-bar end. The spindle of the adapter is fitted with a shell milling cutter of 1.6 in. diameter, which has eight teeth, tipped with tungsten carbide, and driven at a speed of 650 r.p.m. With the cutter

running, the table is fed to the left against a stop, and the saddle is then traversed by hand towards the machine column for the milling operation. Completion of the required movement is indicated by a dial gauge, the plunger of which is engaged by the table as the latter is traversed. The distance from a previously-machined face at the front of the needle-bar end of the arm to the milled face is held to 58 mm. + 0.15 - 0 mm. (2.284 in. + 0.0059 - 0 in.), and the cycle time is 1.2 min.

A cored hole for the take-up lever, in the side of the head which is uppermost in Fig. 3, is next drilled on a small column machine, with the tool

shown in Fig. 4. The shank of this tool has a taper to fit the spindle of the machine, and a transverse slot at the opposite end. In this slot is brazed a carbide blade about ½ in. thick, which is ground to provide cutting edges at opposite sides. The shank material is machined away to provide clearance for the swarf, and the operation is carried out at a spindle speed of 540 r.p.m., with hand feed. The diameter of the hole is 20.5 mm. (0.807 in.), and this machine, together with that shown in



Fig. 2. A face is milled on an interna projection in the column portion of the arm casting at this set-up on an Enshu plain horizontal machine. A long endmilling cutter, of 1 in. diameter, is employed for the operation

Fig. 3, are under the supervision of one operator.

SPECIAL 4-WAY DRILLING MACHINE

A series of drilling operations is next performed on the 4-way machine shown in Fig. 5, which is one of the most up-to-date in the factory and was built by the Mitsubishi Shipbuilding & Engineering Co., Ltd., Hiroshima. This machine incorporates unit heads and other standardized components from the range made by the company, which builds standard and special-purpose machine tools, and the automatic cycle is initiated by push-button. Three unit heads are mounted in horizontal positions round the central fixture, and a fourth head is carried on vertical ways on a column, which bridges the horizontal head at the rear. machine is designed for drilling a number of different castings, and not all the spindles are employed for the operations on this arm.

Before the casting is loaded, a locating arbor is inserted which is a good fit in the line-reamed crankshaft bores and has a shoulder at the larger end. This shoulder is brought into contact with the face surrounding the larger of the bores, at the needle-bar end of the casting, when the arbor is

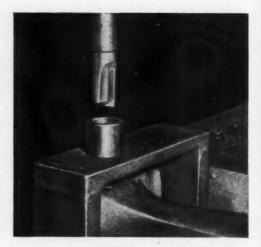


Fig. 4. A special tool, fitted with a 2-edged cutter blade of tungsten carbide, is employed on a bench drill for opening out a cored hole for the take-up lever in one side of the casting

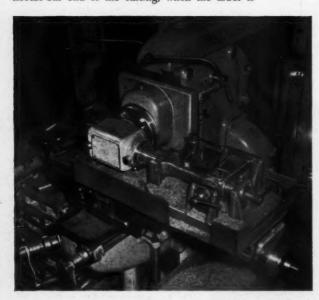


Fig. 3. Another internal milling operation, within the needle-bar end of the arm casting, is performed on this Enshu machine, which is fitted with a special right angle attachment made by Mitsubishi. One operator only is required to supervise this machine and the unit seen in Fig. 2

drawn towards the column end by a quick-acting nut. The arbor ends rest on flat surfaces on the wheeled pallet, which is seen in the withdrawn position in the close-up view of the fixture in Fig. 6. Two wheels of this pallet run on flat surfaces, and two on a guide rail of vee form, the wheels being of corresponding profile.

The operation of pneumatic cylinders which apply clamps to the casting, after the wheeled pallet has been pushed into the fixture by hand, is controlled by the valve A, which has an "off" and two working positions. When the lever of this valve is moved to the first position, a horizontal air cylinder B is energized, with the result that the ram is thrust against the cam surface C, on the side of the pallet. This action causes the pallet to be pushed to the right, until a shoulder on the needle-bar end of the arbor is thrust against a locating The end of the arbor is also face. pushed sideways into a V-location.

When the valve A is turned to the next position, another air cylinder is energized, which turns a vertical camshaft D, through a rack and pinion.

The two cams on this shaft apply thrust directly to the end face of the column, to push this end of the casting towards the rear of the fixture until the periphery of a large washer, previously fitted to the column-end of the arbor, is engaged with a half bore provided in the fixture. When the automatic cycle of the machine is initiated, the drill heads are advanced at fast traverse rates, drill the holes at spindle speeds of 1,131 r.p.m., and a feed rate of 36 mm. (1.417 in.) per min., are rapidly withdrawn, and stop. floor-to-floor time slightly more than 4 min. Holes machined

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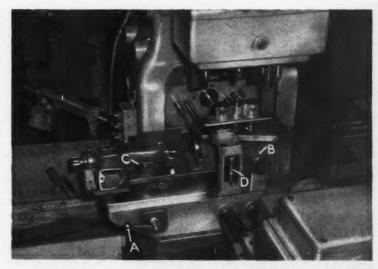


Fig. 6. Close-up view of the fixture on the machine in Fig. 5, showing the wheeled pallet on which the casting is moved into the clamping position, and the valve lever A for the air-operated clamps

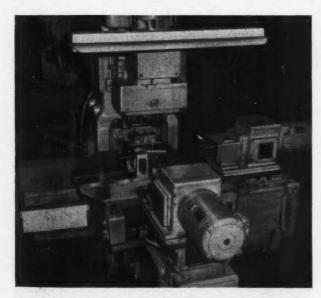


Fig. 5. One of the most up-to-date machines in the factory is this 4-way drill built by the Mitsubishi Shipbuilding & Engineering Co., Ltd., which is employed for drilling numbers of holes up to 20, in castings of different designs. The machine incorporates standardized unit heads and other components

this stage include those for the needleand pressure-bars which are drilled from opposite sides of the casting to diameters of 9.8 and 7.1 mm. (0.385 and 0.279 in.), respectively, at the lower ends, and 10 mm. (0.394 in.) at the upper ends. Three other holes are drilled in the top of the casting by the horizontal head at the rear, and one in the side of the casting, by the vertical head. For certain castings, it may be noted, the machine can drill up to 20 holes.

Successive operations next provide for milling clearances for the pressurebar lifter head and the motor mounting face on the column; drilling the top and side faces for mechanismmounting and cover - attachment screws; tapping %-in. by 28 t.p.i. holes in the column face whereby it is secured to the base plate, on assembly; and machining the take-up lever aperture. The pressure-bar guide grooves and a mechanism clearance recess are then milled, in two separate stages, all these operations being performed on simple machine tools with conventional set-ups.



EIGHT-SPINDLE DRILLING MACHINE

Five holes of diameters from 1.6 to 2.9 mm. (0.063 to 0.114 in.) for label, cover, and thread guide mechanism attachment, are drilled in the rear face of the casting on the newly-installed, 8-spindle machine shown in Fig. 7. Made by the

Fuji-Seiki Machine Works, Ltd., 840 Shimotogari, Mishima City, Shizuoka Prefecture, this machine has a capacity for drilling holes up to 10 mm. (0.394 in.) diameter in steel, and is driven by a motor of 1.3 h.p. through stepped pulleys, which provide spindle speeds from 1,500 to 3,000 r.p.m. Adjustments for height can be made by means of a screw beneath the table, and it is fed upwards for the drilling operation by means of a hydraulic cylinder, at rates which are adjustable over a wide range by means of a flow control valve.

Fig. 8. Holes for the needle bar are line reamed, and holes for the pressure bar are threaded and reamed on this converted lathe, the fixture being pushed towards the tool by hand

Fig. 7. This Fuji-Seiki 8-spindle machine is employed for drilling five holes in the rear face of the arm casting. The table is fed upwards by a hydraulic cylinder

The casting is located from the crankshaft bores, the bore at the needle-bar end being engaged with a fixed arbor on the far internal wall of the fixture as the arm is loaded. A strap E, pivoted at the right-hand end, is then swung into the position shown, where it is locked by a T-stud. Next, a screwed plug, in a threaded bush welded to the strap, is advanced by turning the ball-ended lever F, to engage the crankshaft bore at the column end. When this plug is tightened, pressure is exerted on the casting, to push the face surrounding the crankshaft bore at the needle-bar end against a shoulder on the locating arbor.

The casting is finally located in a horizontal position, with the column-end face vertical, by a camshaft which is turned by the lever G, to bring the cams into contact with the face. With the casting thus located and clamped, a valve lever is operated to start the table feed. Movement is reversed at the top of its stroke, to lower the table, in readiness for unloading. The spindle speed employed is 1,600 r.p.m. Various holes are next tapped, at a series of operations, after which the casting is transferred to the special machine shown in Fig. 8, for line-reaming the

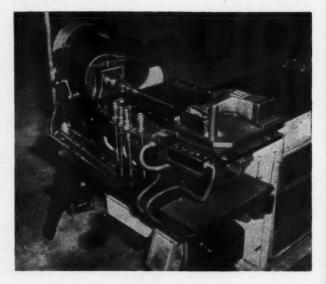


Fig. 9. Shaft components for sewing machines are super-finished on this centreless machine, which was designed and built by the company. Fine-grit stones are oscillated horizontally by an electric vibrator

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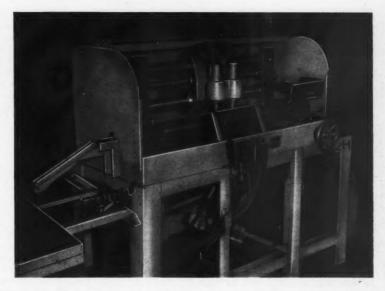
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As may be seen, this machine is an adapted lathe, the bed of which has been fitted with a flat steel plate with a guide fence at the far edge. The fixture in which the casting is clamped is also made from steel plate, and has nest locations for the arm portion of the cast-

ing, the column end being clamped against a vertical face by a thumb-screw. The line reamer is again held in a floating holder in the lathe spindle, which is driven at 393 r.p.m., and the upper and lower hole diameters are finished to $10^{\circ}32 \text{ mm.} + 0^{\circ}021 - 0 (0^{\circ}4063 \text{ in.} + 0^{\circ}0008 - 0)$ and $10 \text{ mm.} + 0^{\circ}017 - 0 (0^{\circ}3937 \text{ in.} + 0^{\circ}0007 - 0)$.



For the operation, the fixture on which the casting is held is pushed by hand towards the reamer, care being taken to keep the far edge of the plate in contact with the fence which is provided on the supporting table.

The same machine is employed for simultaneously tapping the upper, and reaming the lower,

hole for the pressure bar, with a slightly different fixture provided with dogs on the side to operate limit switches for reversing the driving motor for the spindle. The upper hole is tapped 16 in. by 28 t.p.i., and the lower hole is reamed to 7.24 mm. +0.017 -0(0.285 in. + 0.0007 - 0). Finally, the castings are inspected with the aid of "go" and "not-go" gauges, height gauges, and dial indicators, as seen in the heading illustration, on a 2 per On the line described cent basis. above, and in the previous article, some 400 arms are produced per day.



Fig. 10. On the machine in Fig. 9, the shafts are automatically delivered from the bottom of the magazine J, and moved along the feed rolls, which are set slightly out-of-parallel for this purpose

SUPER-FINISHING OPERATIONS

Several of the components employed in Mitsubishi sewing machines—mainly of the industrial type-are super-finished to improve accuracy or fit, and to reduce wear in service. Super-finishing of steel shaft components, such as needle bars, is performed on the centreless machine shown in Fig. 9. which was designed and built in the factory. The base of this machine was weld-fabricated from angle-section steel, and it has a flat top on which are mounted bearing blocks for two long rolls of the same diameter. These rolls are driven by a motor at the far end of the base, through a reduction gearbox and roller chain, at a speed of 200 r.p.m. An idler gear between the rolls ensures that they rotate in the same direction, and each roll has a shallow helical groove, of about 1/2 in. pitch, extending for the full length, to assist in feeding the components.

The bearing blocks for the front roll are fixed, but those at the rear are adjustable to enable the roll to be raised or lowered, or moved towards or away from the front roll at one or both ends, as necessary, to obtain the required feed movement. Brackets at the rear of the rolls carry two parallel shafts on which are supported two cast bridge members, coupled together. A screw, turned by means of the handwheel H, through shafts and bevel gears, provides for the horizontal adjustment of the bridge

members, which can thus be positioned on the shafts at any convenient point.

Another view of the machine, from above, is given in Fig. 10, and it will be seen that the coupling piece between the bridge members has horizontal dovetail guide-ways at the front. In these guide-ways is carried a housing for two vertical air cylinders, with downwardly-projecting rams, at the lower ends of which there are holders for superfinishing stones. The housing also carries an electrical vibrator whereby it is oscillated horizontally through a stroke length of 3 mm. (0.118 in.), at the rate of 1,000 strokes per min. Air pressure applied above the pistons in the cylinders can be varied, by means of valves at the front of the machine, to provide for any desired degree of finish. alundum stones of 800 or 1,000 grit size are normally employed on the machine, which operates on an automatic cycle.

Shafts to be super-finished are loaded into the magazine at the right-hand end of the machine, indicated at J in Fig. 10, which is provided with guide channels to direct them to the feed position. Interchangeable magazines are provided to suit shafts of different lengths or diameters. At the bottom of the magazine channel, the lowest shaft falls into the space between the rolls, and due to the setting, it is caused to progress to the left, passing beneath the super-finishing stones in a period

determined by the angular relationship of the roll axes. Shafts are thus continuously fed beneath the stones, and they pass out of the machine down a chute at the further end.

A mixture of paraffin and light spindle oil is sprayed on to the stones to provide for cooling and lubrication. An example of a component finished on this machine is a needle shaft for industrial sewing machine, which is centreless ground to a diameter of 6.35 mm. +0 -0.009 (0.2499 in. +0 -0.00035 in.). During the subsequent superfinishing operation, the quality of the surface is improved, and close limits for roundness and parallelism are held.

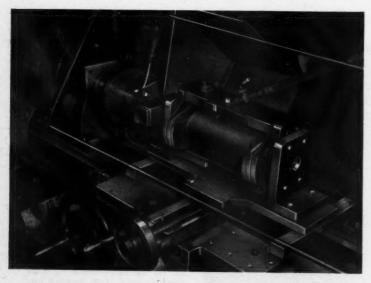


Fig. 11. One form of super-finishing attachment, here seen applied to a lathe for finishing a bore in a cam ring, has a stone holder which is oscillated by the movements of a piston in a horizontal air cylinder

Super-finishing is also carried out on internal surfaces in components such as cam rings and connecting rods industrial sewing machines, and a typical set-up, for finishing a bore of 32 mm. +0.017 -0 (1.259 in. +0.0007-0) diameter, in a steel cam-ring, is shown in 11. The small lathe has been specially adapted for this work, and the cross-slide is fitted with a flat steel plate which is supported on cross-bars at the overhanging ends. Brackets on this plate support an cylinder between air two spring leaves, and the piston in the cylinder reciprocates rapidly, operating a valve at each end of its travel to re-

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verse the direction of the air supply. The leaf springs allow the cylinder to move horizontally through amplitudes between 0.04 and 0.08 in.

Variations in the air supply to the cylinder cause changes in the amplitude of the oscillations, and in the number of strokes per min. which can be varied from 1,000 to 2,500. At the end of the cylinder nearer to the headstock is a spring-loaded holder for a honing stone of 800 to 1,000 grit size, and the cross-slide can be adjusted to bring this stone into contact with the bore of the component to be superfinished, which is rotated by the machine spindle. The annular cam-ring shown is clamped in a faceplate fixture, to avoid distortion of the bore, and is rotated at 250 r.p.m. During the super-finishing operation, which produces a surface of high quality, bore-diameter is enlarged by 0.05 mm. (0.002 in.)

Another arrangement for performing a similar operation is shown in Fig. 12, where a super-finishing attachment is mounted at the rear end of the cross-slide on a small centre lathe. Covers have here been removed to show some of the mechanism, and the drive is taken from a %-h.p. motor through spur reduction gearing. The driven gear is mounted on a shaft which has an eccentric pin at the front end, and in front of the shaft housing there is a bracket with dovetail ways. A slide, carried in these ways, has a vertical slot to engage the eccentric pin, and it is thus reciprocated horizontally as the shaft rotates.

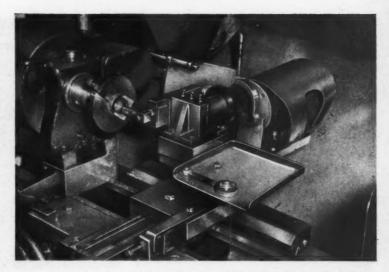


Fig. 12. Oscillation of the honing stone is effected mechanically with this super-finishing attachment, which is here seen set up for operation on the large bore of a connecting rod for an industrial sewing machine

The eccentricity of the pin imparts a movement of 2.5 mm. (0·1 in.) to the slide, which is reciprocated at 1,200 strokes per min. At the left-hand end of the slide there is a right-angle bracket with dovetail ways for a second slide which is springloaded towards the rear of the machine. This slide is provided with a knurled-head screw whereby the spring-loading can be adjusted, and it carries a holder for the green carborundum honing stone, of 1,000 grit. The set-up shown provides for superfinishing the bore of a connecting rod for an industrial sewing machine, which is held on a face-plate fixture and driven at 220 r.p.m. The bore diameter is 32 mm. + 0·030 - 0 (1·259 in. + 0·0012 -0), and the width % in.

Further articles, concerned with Japanese machine tool factories, will be published in forth-coming issues of MACHINERY.

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Production of Office Machinery. During the year 1960, the value of standard and portable type-writers produced, including electric units and parts, was £11,040,000, and machines and parts valued at £4,872,000 were exported. The value of accounting and similar machines produced was £39,724,000, and machines and parts to the value of £16,896,000 were exported. Other office machines to the value of £12,876,000 were also produced during the same period.

Producing Small Parts from Sheet Metal by Etching

Based on the normal equipment employed for photo-engraving, and experience gained in this field, the Beck Engraving Co., Philadelphia, Pa., U.S.A., through a subsidiary, the Chemical Micro Milling Co., has developed processes for making a variety of small parts such as are required in computers, missile guidance systems, and other electronic apparatus.

An important advantage of these processes is that it is possible to deliver finished parts within hours after the receipt of an order. Moreover, the work, as produced, is flat, unstressed, and free

from burrs.

Small parts are produced in multiples, the number being limited only by the size of the work in relation to the capacity of the camera and the width of the metal strip. Since wear of tools cannot affect the results, uniform accuracy is ensured, regardless of the length of run.

An intricate part can be produced as rapidly as one of simple form, once an enlargement of the customer's drawing has been completed. Because

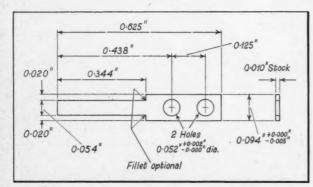


Fig. 1. From this drawing of the part, the draughtsman estimates the magnification needed to enable the parts to be produced within the specified tolerances



Fig. 2. At the first reduction from the original negative enlargement, this positive is obtained

the drawing is greatly enlarged, the effects of errors are reduced to a point where limits on the finished parts can be held to ± 0.0005 in.

The process is particularly suitable for the production of parts required in connection with the miniaturization of various assemblies. Thus, many components for electronic apparatus can now be made economically to the scaled-down dimensions required. Such components include intricate cams, nozzle filters, contact springs, vibrator springs,

galvanometer mirror frames, vacuumtube components, flapper valves, amplifier shields, transistor evaporator masks, and digital light-attenuation masks. Some of the masks take the form of grids with complicated configurations of holes so small that they can only be observed under a magnifying glass, and with centre distances so closely spaced as to preclude conventional stamping. One of the grids has a pattern of rectangular holes only 0-0085 in. wide.

Typical of the items which are being made by photo-chemical methods is a part for an electrical-contact mechanism. It is made in two types from 0·010-in, thick half-hard, spring-tempered, nickel silver. The customer's drawing of the part, as

shown in Fig. 1, was first examined to determine the scale of the enlarged drawing required. In this instance, it was decided, from experience, that an enlargement of $50 \times$ would be sufficient to compensate for any drawing errors and enable the specified tolerances to be maintained.

The drawing is made on Stabilene film, which is permanent and highly moisture resistant. In this instance, the enlarged drawing was made in reverse (black on white), to suit the number of camera reductions involved. Since the contour of the part is simple, the draughtsman is able to complete his work in well under an hour.

At the first of two reductions on a Klimsch precision camera, a negative of the negative "art work" (a positive) is made directly, as seen in Fig. 2. A second reduction on the same camera then produces a negative which is the exact size of the finished part.

Next, after taking various factors into account, the number of pieces to be etched at one time is decided, in this instance, 360.

The 360 reproductions required are made on a single sheet of film with a Rutherford step-and-repeat camera. First, the image is repeated horizontally to form a row of five. This row is then repeated vertically until a rectangle of six rows is obtained. The thirty images are now repeated

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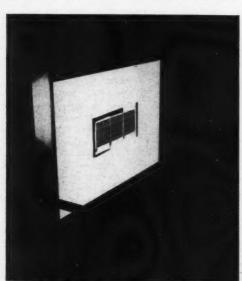


Fig. 3. The plate and superimposed printing master are held in a vacuum frame and exposed under carbon-arc lighting



Fig. 4. After the etching stage, a 100 per cent inspection of the parts is carried out on an optical comparator

as a unit until there are 12 such rectangles on the film, which is known as the printing master.

The nickel-silver material, supplied in sheets sheared to the size of the printing master, must be cleaned thoroughly. For this purpose, the sheets are scrubbed with a rotating brush through which water flows. Any dirt on the surface acts as an insulator and affects chemical attack. A phosphoric-acid treatment, next performed, roughens the surface sufficiently to form a good base for the subsequent coating operation.

Kodak metal-etch resist (KMER) is applied to the plates in a room illuminated by gold fluorescent tubes. The resist, in the form of a thick liquid, is poured on. Drying requires about 30 min. and to ensure a uniform coating, the plates are placed in a whirler for the drying period.

To expose the image, the printing master is placed on top of the plate, and both are positioned in a vacuum frame. Flatness is ensured by evacuating the frame. It is then tilted as seen in Fig. 3, in front of carbon-arc lamps, and the exposure time is 4 to 8 min. When the plate is removed from the frame, it is immersed in a developer from 2 to 3 min. A water spray is then applied to flush away the developer and dissolved resist.

Actual etching—chemical milling—is performed in a ferric-chloride bath, the immersion time

being approximately 4 min. To remove the resist, the plate is soaked in xylene, and then scrubbed

with a bristle brush.

Each plate is subjected to a 100 per cent inspection on an optical comparator, as seen in Fig. 4. It will be observed that thin ribs of metal hold each row of tabs together. The rib pattern is added to the negative prior to the step-and-repeat camera operation. By leaving the parts attached to the plate, their removal from the etching machine is simplified, also final processing, inspection, and despatch. At the customer's plant, the ribs are snipped off before the parts are used.

Good results have also been obtained when etching copper and aluminium, and their alloys. Ferrous metals, ranging from pure iron to mediumcarbon steel, can be handled successfully, and high-carbon and alloy steels can be etched satisfactorily, but at somewhat greater cost.

Generally, a material thickness of 0.020 in. is considered the practical maximum, unless edge taper is permissible. Above 0.008 in., edge taper is frequently reduced by etching both sides of the material simultaneously. For this purpose, both sides are coated with the resist, exposed, and

developed.

Facing and Centring Steel Forgings

The illustration gives a close-up view of a Cincinnati duplex milling machine set up at the Gateshead works of Armstrong-Whitworth (Metal Industries), Ltd., for facing and centring steel

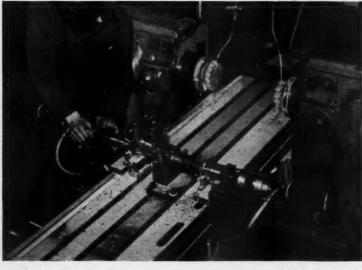
forgings.

A forging to be machined is held in a fixture secured to the table, and at the first stage in the operating cycle, a cut is taken on both ends by face-type cutters mounted on the milling spindles. Next, the table is traversed on the bedways to bring the forging into line with two ½-in. capacity air-operated drilling heads as shown. Fitted with

centre drills, these heads are mounted on slides which are supported by brackets secured to the sides of the bed.

The centre-drilling cycle is now started by means of a single lever-type air valve, operation of which causes compressed air to be delivered to the drilling heads for driving the spindles at a speed of 550 r.p.m. At the same time, the coolant supply is turned on, and the slides which carry the heads are advanced towards the work by the action of hydraulic cylinders carried on the support brackets. Oil from an air-hydraulic

reservoir is delivered under pressure to the outer ends of both operating cylinders simultaneously, for moving the slides during the drilling stroke, and the oil discharged from the inner ends of these cylinders is passed to a second air-hydraulic When the reservoir. slides are to be returned to their original positions at the end of the drilling stroke, the control valve is reversed, with the result that oil from the second air-hydraulic reservoir is delivered under pressure to the inner ends of the operating cylinders. hydraulic equipment for this installation was supplied by Martonair, Ltd., Richmond, Surrey.



Close-up of a Cincinnati duplex milling machine, with auxiliary air-operated drilling heads, set up for facing and centring steel forgings

Large Fromag Keyseating Machine

A VERY LARGE KEYSEATING MACHINE, designed and built by the German firm of Fromag, has recently been supplied to the Manganese Bronze & Brass Co., Ltd., through Mortimer Machine Tool Co., Ltd., Mortimer House, Acton Lane, London, N.W.10, who are the sole selling agents in this country. A model of the machine is illustrated in Fig. 1, and it has capacity for machining keyways from 11% to 71% in. wide in bores from 11% to 59 in. diameter, and of 6 ft. 6 in. maximum length.

The machine has been installed for cutting keyways in marine propellers, which may weigh up to 70 tons, and to simplify loading and setting operations, it is so constructed that only the headplate is above floor level, the remainder of the structure being housed in a deep pit. A control console is mounted on the floor some 20 ft. from the machine, and very large workpieces, of 39-ft. maximum diameter, can be handled.

To overcome difficulties associated with the accurate setting-up of heavy workpieces, the machine has been provided with a floating table, so that the normal hoisting arrangements furnished in the shop need only be employed for loading the component to be machined approximately in the correct position. The component is then accurately set by adjusting the floating table. This table is arranged to move on rollers, and to prevent

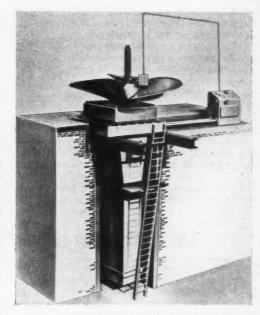


Fig. 1. Model of a large Fromag keyseating machine for marine propellers

damage when a heavy workpiece is deposited, the table is supported by hydraulically-powered lifting jacks. After the work has been loaded, the table can be lowered gently into contact with the rollers.

Marine propellers usually have wedge-type keyways, machined at an angle to the bore axes, and to provide for cutting such keyways, a tilting table is mounted on the floating table of the Fromag machine. Fig. 2 is a view of a marine propeller set up on the machine, and the floating and tilting tables may be clearly seen.

The machine is hydraulically powered, and the main controls and valve gear for the system are housed in the console. Oil is delivered by a high-pressure, axial piston pump, driven by a 10-h.p. flange-mounted motor. Movement is imparted to the tool-slide by two parallel hydraulic



Fig. 2. Close-up view of the Fromag machine showing a propeller set up on the tilting table, which is mounted on the floating table

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cylinders, and the cutter support bar is mounted so that its axis is between the axes of the cylinders. This arrangement, it is claimed, ensures that the slide guideways are not subjected to any side strain. Movement of the tool-slide is controlled electro-magnetically, motion being transmitted by means of a chain and universal shaft to a stroke drum. Reversal of the slide is effected by adjustable dogs on the drum, which can be set to correspond accurately to the length of the workpiece bore.

A maximum cutting thrust of approximately 8 tons can be applied, and to prevent overloading of the tool, the thrust can be limited by means of a pressure switch, which is steplessly adjustable. This switch stops the machine if the pre-set value for the cutting thrust is exceeded.

Cutting speeds, which are steplessly variable from 6·5 to 26 ft. per min., are controlled by adjustment of the axial piston pump, and changes can be made while a cutting operation is in progress. Return movements of the tool-slide (upwards) are at a constant rate of 50 ft. per min. Six rates of automatic in-feed are available, from 0·0008 to 0·0098 in. per stroke.

It may be mentioned here that the Fromag company already have a new machine of similar capacity under construction. This machine will have a fixed table and a movable base and ram assembly. With this arrangement, it is anticipated that setting-up times will be reduced, since it will be easier to adjust the base and ram assembly, which will weigh 6 tons, than to move the table carrying a workpiece weighing, perhaps, 70 tons.

Automatic Copy-turning of Gearbox Main-shafts

The production of gearbox main-shafts for the Vauxhall Victor passenger car was described in an article in Machinery, 92/959—25/4/58. Copyturning operations were then being performed on +GF+ (Vaughan Associates, Ltd.) and Churchill Redman lathes. New plant recently introduced for operations on this component includes the Churchill-Redman type P.5 lathe shown in Fig. 1, which is employed for roughing, prior to copyturning over the full length at two stages. Forged blanks for the shafts are first faced and centre-drilled on a Standard-Modern duplex machine, and

are then placed in the holders of the magazine conveyor at the right in Fig. 1, in which they are carried to the loading position.

There is a similar conveyor at the left to receive the machined workpieces, and each of these units has a pressed steel supporting framework with legs which are adjustable for height to suit the machine installation. Each unit incorporates two roller chains, spaced about 12 in. apart, which pass over sprockets on shafts at the ends, and are driven by a small motor housed within the sheet metal casing. The chains carry plates at intervals of about 4 in.,

and the upper edges of these plates are so shaped that they form V-grooves when the chain is flat. Forgings to be machined are placed in these grooves in the unit at the right, and are carried by successive indexing move-



Fig. 1. General view of the Churchill - Redman, 15 by 20, P.5 hydraulic copy-turning lathe, recently installed at the works of Vauxhall Motors, Ltd., Luton, for operations on, gearbox main - shafts



Fig. 2. In this close-up view of the P.5 lathe, with a gearbox main-shaft forging in position, can be seen the three steps which are machined in a cycle time of 34 sec. A gauging head on the slide B stops the machine when the diameter of the centre step exceeds the preset dimension by 0.003 in.

ments to the lowest position, whence they are picked up by loading arms.

The loading and unloading equipment provided for the P.5 machine was described in MACHINERY, 96/153—20/1/60. Briefly, it may be recalled, it comprises pivoted arms, one for loading and one for unloading, which are carried on hydraulically-operated slides on the front face of the tailstock and on top of the headstock, respectively. These arms have hydraulically-operated fingers, and they are so arranged that they can be raised and lowered,

moved horizontally, and pivoted through angles up to 90 deg. by a hydraulic system. The supply of pressure oil for this purpose is governed by solenoid valves and limit switches on the machine, interconnected

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with other limit switches which control the indexing movements of the transfer units.

When an unmachined forging reaches the lower end of the magazine unit at the right in Fig. 1, it operates a micro-switch at one side, and the drive to the roller chains is stopped. At the end of an unloading cycle, provided that the loading position of the right-hand magazine unit is occupied,

the fingers of the arm A, which are of V-form, are closed over the next forging to be machined. The arm is then turned to a position such that the forging is held in alignment with the head- and tailstock centres and the tailstock is moved to the left. This action carries the left-hand end of the forging into the space between the chuck jaws and engages the centre hole at that end with a centre in the chuck.

The chuck jaws are now closed hydraulically, and, at the same time, the tailstock quill centre is





advanced into engagement with the centre-hole in the right-hand end of the shaft. The fingers are next opened, the movement being sufficient to ensure that they clear the shaft when the arm is swung back to its orginal position. During the automatic machining cycle which follows, three steps at an intermediate position on the shaft, as seen in the close-up view in Fig. 2, are turned to diameters of 1.023/1.028, 1.271/1.274, and 1.479/1.482 in., leaving amounts ranging from 0.011 to 0.020 in. on the diameters, for removal at subsequent stages. A spindle speed of 1,850 r.p.m. is employed, with a feed of 0.018 in. per rev., and machining is completed in about 30 sec.

At the end of the cycle, a gauging head, mounted on the tool-slide B, at the rear of the machine, is advanced into contact with the central step. The arrangement is such that when the diameter measured increases to more than 0.003 in. over the pre-set dimension, the machine is stopped. At the same time, a warning lamp is illuminated to indicate to the operator that the tool must be changed. When the spindle is stopped by the built-in

brake, the unloading arm C, Fig. 3, is swung round and the fingers are closed on to the shaft that has just been machined. The grip of the chuck jaws is then released, the tailstock is moved to the right to disengage the right-hand centre, and the unloading arm slide is also moved to the right to carry the workpiece clear of the chuck jaws.

Next, the arm C is swung forward, and moved to the left on its slide, until the workpiece is directly above the empty position at the lower end of the left-hand conveyor unit. When the fingers are released, the forging is deposited in the V-grooves, and it operates a switch to start the conveyor drive motor.

Another limit switch, which stops the motor, is operated by the same forging when it has been indexed one position. Loading and unloading occupy 4 sec., so that the time for the complete cycle is about 34 sec. When the gate between the two transfer units is opened to permit access for setting, the loading equipment is automatically isolated by a switch. The machine can then be run under the control of the operator.

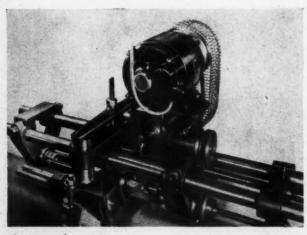
Buma Coupling Boring Machine

Buma Engineering Co., Ltd., Robson Street, Newcastle-upon-Tyne 6, have introduced a new design of portable machine, as shown in the accompanying illustration, for fine boring the driving bolt holes in coupling flanges in situ. For example, a 10-in. wide coupling can be bored when

the available space is only 22 in., and less space is required for shorter couplings. The machine is clamped and located on the flanges to be bored.

The boring bar runs in high-precision, combined thrust and needle-roller bearings, housed in steady brackets at each side of the coupling flanges.

Stepped V-belt pulleys provide three speeds, and the unit has power feed. A special micrometer is supplied for setting the cutting size of the tungsten-carbide tipped cutter, and the latter is sharpened on a built-in metal-bonded diamond wheel, jigs being used to ensure the correct cutting angles. On the standard type FM machine parallel holes only can be bored, and it is supplied with a plain bar. A taper boring unit, however, can be installed without the need for any modification. In this unit, the cutter is held in a carriage which slides on anti-friction bearings along two guide rails, the latter being adjustable for angle. Accurate setting of the angle of taper is obtained, on the sine-bar principle, by placing a distance piece of the required length under a setting pin.

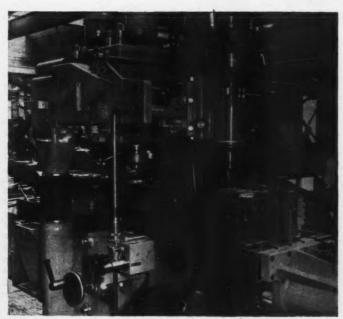


Buma type FM portable fine-boring machine for couplings

Round the Shops with a Camera

Installed in the tool room at the Uzwil, Switzerland, works of Buhler Brothers, Ltd., this Montanwerke Walter (Elgar Machine Tool Co., Ltd.) universal cutter grinder is seen set-up for regrinding a face-milling cutter of 250 mm. diameter. This cutter has 16 inserted blades, tipped with tungsten carbide, which are ground at an angle of 30 deg. in the manner indicated. A diamond wheel of 240 mm. diameter is mounted on the spindle for lapping the cutting edges after they have been ground with a conventional wheel. The machine operates on an automatic cycle, and for this cutter the grinding time is 11 hours, and the lapping time, 20 min.





This Swiss Rigid (Dowding & Doll, Ltd.) copy milling machine is employed in the die-making shop of Buhler Brothers, Ltd., at Uzwil, Switzerland, for operations on die casting and forging dies. It is shown set-up for machining impressions in both halves of a drop hammer die from a common pattern, mounted at the end of the table in the foreground. The die, for forging chain conveyor links, is one of a pair which provide a total of four impressions for rough, semi-finish and finish forging operations on a single hammer. For the die-sinking operation, the table is traversed longitudinally, and is automatically fed transversely at each end of the stroke, in increments of 1 mm., for roughing, and 0.3 mm. for finishing. The total time required to finish the die halves from the solid is 55 hours

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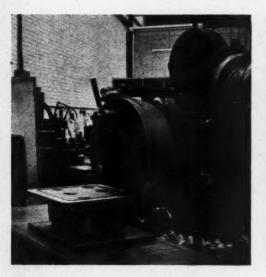
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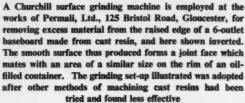
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The Bohner & Koehle (Elgar Machine Tool Co., Ltd.) pattern milling machine here shown is employed for producing joint faces on resin-impregnated glass fibre mouldings at the works of Permali, Ltd. The ragged edges of the rectangular opening in the moulding are removed in one pass by an abrasive disc and the dust produced during the operation is drawn into the two flexible hoses which are connected to exhaust ducting. The work is held by clamps at the four corners



(left). The special-purpose vertical-spindle copy milling machine here shown was designed and built by Talbot-Ponsonby & Co., Langrish House, near Petersfield, Hants., for producing small profiled parts to close limits of accuracy, as exemplified by the light alloy impeller seen mounted on an indexing head for machining from the solid. This impeller, with an overall diameter of 21 in., has 26 blades, which are held to a tolerance of 0.0005 in. on form. A master template of the blade form is traced by a stylus which is guided by hand, and the movements are transmitted, through pantograph arms, at a reduction of 5:1, to a cutter mounted in a Precise high-speed spindle, and driven at 40,000 to 45,000 r.p.m. The cutters employed for this work are made from Tunbo high-speed steel supplied by Geo. H. Alexander Machinery, Ltd., and range in diameter from 0.042 in. to 0.056 in.

(right). A stress-relieved weldfabricated gearbox is here seen mounted on the rotary work-table of a Dixi 75 (Dowding & Doll, Ltd.) horizontal jig boring machine, at the works of Morfax, Ltd., Mitcham, Surrey, for facing on both sides, and boring at one setting. Bore centres are held to limits of \pm 0.0005 in. When fully machined, the gearbox is pressure tested. Motor drive is provided for the work-table, which can be indexed through 360 deg. and set to an accuracy of \pm 1 second of arc. The spindle head has 28 in. of vertical adjustment and the quill has a feed travel of 18 in. by hand or power

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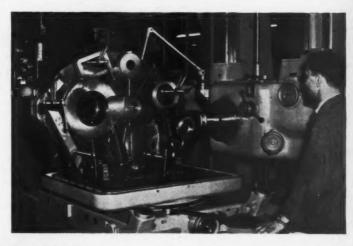
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(right). The Société Genevoise No. 4 jig boring machine here illustrated was built about 25 years ago and later reconditioned by Sogenique, Ltd., prior to its installation in the works of Morfax, Ltd., Mitcham, Surrey, where it is employed solely as a measuring machine. The spindle housing has been modified to receive a number of standard attachments which were supplied with an S.I.P. MU 214B measuring machine installed in another part of the works. The inspector is here using a feeler microscope, which is illuminated by collimated light, to check an internal dimension of a component clamped to an S.I.P. type PD-3 rotary table. This machine is stated to be accurate to within \pm 0·000025 in. over a measuring range of 24 in. by 16 in. by 24 in. high

(left). A Newton Victor 140-kV., 5-milliamp, X-ray set is employed by Morfax, Ltd., Mitcham, Surrey, for the radiographic examination of welds in fabricated parts produced by the Argonarc and other processes, as exemplified by the flanged cylinder shown in the illustration. Overlapping radiographs covering the full lengths of both circumferential welds are taken and then examined for defects which may include lack of fusion, porosity, and inadequate penetration. The X-ray equipment is installed in a leadlined enclosure and controlled remotely by trained operators who are safeguarded in accordance with I.S.O. recommendations. Mobile equipment is available for site work



Inert-gas Tungsten-arc Spot-welding for Missile Assemblies

By W. P. McGREGOR*

Investigations concerned with spot-welding by the inert-gas tungsten-arc method have been undertaken by the Manufacturing Development Department of Convair (Astronautics) Division, General Dynamics Corporation, San Diego, Calif., U.S.A. It has been found that this technique can be applied successfully to the welding of components for Atlas missiles when correct procedures are followed. For the purpose of the investigations, the combined thickness of the materials that were spot-welded was limited to a range of 0·020 to 0·100 in.

It is considered that the inert-gas, tungsten-arc, spot-welding process can be widely employed, and since welding is carried out from one side only, it should find numerous applications, in circumstances where other welding processes are unsuitable. For the materials and thicknesses covered by the tests, it was found that consistency, reliability, and reproducibility were comparable with those obtainable with resistance welding. All thicknesses of metal, and combinations of thicknesses, used for the tank sections of Atlas missiles were spot-welded during the trials, which covered a total of 138 different combinations.

The investigations showed that current density, arc length, number of cycles, gas coverage and flow, the type of electrode and its preparation, basemetal preparation, contact of mating surfaces, and type of back-up material employed, all influenced the results, and needed to be accurately controlled. Moreover, the current required depends on the thickness and condition of the materials to be welded, length of welding time, the type of electrode and its preparation, and the type and flow of the inert shielding gas. An arc length of to in., as pre-set by the makers of the welding machine, was found to be satisfactory. The number of cycles employed depended upon the thickness and condition of the material to be welded, the amount of heat or current required, the type of electrode and its preparation, and the type and flow of the inert shielding gas.

Two inert gases were tested, namely, helium and argon. Less heat, or current, was required to

produce a good weld when helium was used, and a flow of about 10 cu. ft. per hour provided the most effective shielding. Higher flow rates tended to force the pool of molten metal through the base-material, whereas with lower flow rates the shielding was not sufficient to protect the weld from oxidation. Mixtures of argon and helium were not tested because adequate facilities were not available to permit experiments with mixtures. This phase of the investigations was considered to be very important, as adequate gas shielding is a vital factor in the successful welding of stainless

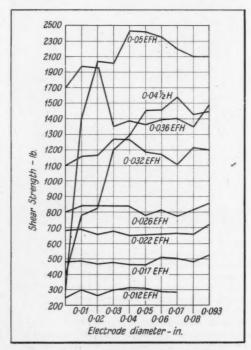


Fig. 1. Curves showing the relationship between shear strength and electrode diameter when work materials of various thicknesses were spot-welded by the inert-gas tungsten-arc process

^{*} Tool Development Engineer, Convair (Astronautics) Division, General Dynamics Corporation, U.S.A.

WE	LDING SCH	EDULE FO	OR 301 STA	INLESS STEEL
Thickness of metal, in.	Condition of metal	Amp.	Cycles	Gas, cu. ft. per hou
0·012 0·017 0·022 0·026 0·032 0·036 0·040	EFH EFH EFH EFH EFH	20 32 48 64 100 140	10 10 10 12 15	10 Helium—3 Argor 10 Helium—3 Argor 10 Helium—3 Argor 10 Helium—3 Argor 10 Helium—3 Argor 10 Helium—3 Argor 10 Helium—3 Argor

steel, also it protects the tungsten electrode from oxidation.

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Tungsten electrodes employed for the welding tests may have various end shapes, ranging from a plain type, of the full diameter, to a needle point. By varying the diameter of the electrode end, and maintaining all other factors constant, it was found that varying degrees of penetration, and weld nuggets of different diameters, were obtained. The chart in Fig. 1 indicates the shear strengths obtained when using electrodes of various diameters, the other factors affecting the welding operation being held constant.

Data relating to tests on sheets of 301 stainless steel of various thicknesses are given in the accompanying table. Electrodes of $\frac{3}{32}$ in. diameter, made from 2 per cent thoriated tungsten were used, and were prepared to provide ends ranging from a point to the full electrode diameter, in increments of 0·010 in. Five spot-welds were made with each electrode on the 0·036-in. material, but on all other thicknesses only one spot weld was made with each electrode.

From the curves in Fig. 1, it will be seen that for metal thicknesses ranging from 0·012 to 0·026 in., constant shear strength and weld-nugget diameters were obtained, regardless of the size of electrode used. A welding arc could not, however, be established on 0·012-in. thick material with electrodes of 0·080 and 0·093 in. diameter. For metal thicknesses of 0·082 in. and over, the most suitable electrode diameters are 0·030 to 0·060 in. When welds were made with electrodes of 0·060 to 0·093 in. diameter, oval nuggets, with excessive indentation, were often obtained. Such welds result in rejection of the workpieces even if the shear strength and penetration are acceptable.

Under certain conditions, penetration through the layers of work material became funnelled or cone-shaped, as indicated at A, Fig. 2. When an electrode with a flat end of larger diameter was used, penetration assumed the shape seen at B. The nugget here is of approximately constant size through the plates. A radius on the end of the electrode promoted more consistent welding. It was found advisable to re-dress the end of the electrode when any contamination was evident. Moreover, the weld was affected by any change in the diameter or radius of the electrode due to burn-off.

From the tests it is concluded that both inner and outer surfaces of the material to be welded should be thoroughly cleaned, to ensure freedom from any foreign matter that would contaminate the weld or impede the formation of the arc. The edges of the material should be de-burred to ensure proper mating of the contact surfaces. When thin materials (up to 0.014 in. thick) are welded, the heat from the arc causes the bottom sheet to pull away from the upper sheet, with the result that a nugget is formed between the plates, as seen at C in Fig. 2, and the weld is weakened. Similarly, if insufficient pressure is applied during welding, the plates will not be held firmly in contact, and a nugget will again be formed between the sheets, as shown at D. Because of the absence of pressure applied through the electrode, as in resistance welding, mating surfaces must be held in intimate contact to ensure a satisfactory weld.

A limited amount of development work was carried out in connection with the use of copper

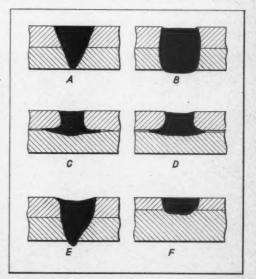


Fig. 2. Diagrams showing the penetrations obtained with inert-gas tungsten-arc spot-welding under varying conditions of electrode form and welding pressure

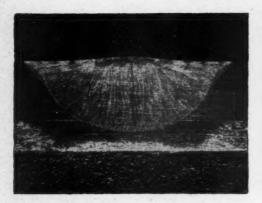


Fig. 3. Photomicrograph of a cross-section of a spot-weld between three metal sheets made by the inert-gas tungsten-arc process

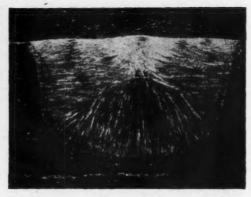


Fig. 4. Photomicrograph of a cross-section through a weld between two sheets of stainless steel, one annealed and the other extra-hard

as a back-up material. Consistency of the welds when copper was used for backing-up was superior to that of welds produced without backing. Fig. 3 and 4 are photomicrographs of welds which were backed-up with copper. Aluminium and stainless steel were also used as backing-up materials, but the results obtained were inconclusive. were made with an inert-gas supply to the underside of the work, and the oxidation that normally occurs was thus eliminated. The welds produced were then as clean and free from oxide on the reverse side as on the top of the work.

Fig. 3 is a micrograph through an inert-gas tungsten-arc spot-weld through three layers of extra-hard type 301 stainless steel, the thicknesses of the layers being 0.025, 0.026 and 0.025 in. Tensile tests indicated that consistency of welds thus produced was maintained within about ±5 per cent. The micrograph, Fig. 4, is of an inertgas tungsten-arc spot-weld through 0.093-in., annealed, type 321 stainless steel and 0.032 in., extra-hard, type 301 stainless steel.

Welding of two sheets of material of approximately the same thickness, of the order of 0.025 in., was attempted, and considerable difficulty was experienced in obtaining enough penetration to give the required shear strength, while avoiding excessive drop-through, as indicated at E in Fig. 1. Little trouble was encountered, however, in welding thin to thick materials and vice versa, as indicated at F.

Welding of copper, K-Monel, aluminium alloys, brass, titanium, and types of stainless steel other than those indicated above, was also carried out during the investigations, but the results were

inconclusive. It was found that most of these materials could be welded to some extent, but additional research will be necessary in order to establish data relating to weld quality and working conditions for each type of material and thickness.

TESTING MATERIALS FOR RESISTANCE TO METEOROIDS. In connection with the development of materials for use in the construction of space vehicles that will resist the impact of meteroid particles, Chance Vought Aircraft Inc., Texas, U.S.A., are carrying out experiments with a special "gun." For this purpose, it is stated, an explosive charge in which a cone-shaped steel "wave shaper" is embedded, is employed to impart a velocity of more than 23,000 ft. per sec. to an aluminium pellet. The gun and test specimen are enclosed in a 10-ft. long by 4-ft. diameter vacuum chamber which enables atmospheric conditions in space to be simulated. Although the pellet employed weighs only 0.2 gm., penetration of about ¼ in. into solid metal is obtained.

Pellet velocities do not approach the maximum speeds of meteoroids which are believed to reach 220,000 ft. per sec. in relation to the earth, but it is considered that important information is being obtained. In addition to penetration resistance, lightness is of great importance in connection with space vehicle structures, and the company is investigating the potentialities of double and multilayer, also honeycomb sandwich constructions. Tests have so far been made with sandwich samples of aluminium, titanium, and combinations of metals

and glass fibre.

Daystrom XactRAY X-ray Thickness Gauging Equipment

Daystrom, Ltd., Gloucester, is the name and address of a company recently formed for handling the sales and service in the United Kingdom for XactRAY X-ray thickness gauging equipment for rolled strip and extruded products in a variety of metals, which is made by the parent organization in the U.S.A.

Five measuring heads are available for use with this equipment, which cover thicknesses ranging from 0·00035 in. for aluminium foil up to 2 in. for mild steel plates. Each head enables a wide range of thicknesses of materials to be checked. The head for measuring aluminium from 0·010 to 2 in. thick, for example, is operated in conjunction with a 60 kV. X-ray generator. It is stated that rolled strip and extruded products can normally be measured to an accuracy better than ± 1 per cent, and that, if required, provision can be made for the accuracy to be held within ± 0.5 per cent.

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ples etals One of the measuring heads in the range is here shown set up for checking the thickness of metal strip while rolling is in progress. An X-ray source and a pick-up are mounted, respectively,

below and above the strip to be measured, at the ends of a C-shaped frame, and the pre-set distance between them may range from 6 to 36 in., depending upon the work thickness. The frame can be mounted on wheels, and power traverse can be provided by motor drive, if required, to enable the X-ray source and the pick-up to be set in various positions for checking the thickness of the strip at different distances from one edge. With an alternative arrangement for use, for instance, when space is restricted, the X-ray source can be mounted on the rolling mill. Both units have been designed for operation under severe rolling mill conditions, and are sealed to prevent the ingress of oil, water and steam. Special armoured gauging heads can be supplied for particularly heavyduty applications.

When gauging is in progress, X-rays, in a "pencil" beam from the

source, are applied to the lower surface of the strip, and the intensity of the beam received by the pickup is reduced by an amount which depends upon the strip thickness. Electric signals from the pickup are continuously passed to an electronic console, which may be positioned at distances up to 100 ft. from the gauging head, and readings, indicating any variations in thickness of the strip, above or below the pre-set value, are obtained on a dial-type instrument. Alternatively, the signals can be applied to a recording unit of the paper-strip type, and variations in thicknesses are then shown in the form of a graph.

Since the X-rays are applied to the strip in a very narrow beam, the need for screening is avoided, and it is stated that at the highest intensity obtainable, the radiation level at a distance of 1 ft. is considerably less than the maximum normally specified for safety. The console usually incorporates dials, switches, and signal lamps which are employed for setting purposes. Alternatively, this equipment may be built into a separate unit which may be positioned at distances up to 200 ft. from the main console, to permit remote



Close-up view of one of the measuring heads for the Daystrom XactRAY X-ray gauging equipment

control. Compressed air is circulated within the console to prevent the ingress of dust and dirt, and the electronic equipment is mounted on a hinged chassis which can be swung clear to facilitate maintenance. A multi-position selector switch is provided which can be set to suit the density of the strip to be checked.

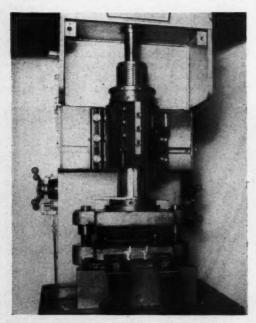
A patented feature of the XactRAY equipment

is that metal setting pieces, housed in a sealed chamber, can be brought to the working position between the X-ray source and the pick-up by means of remotely-controlled rotary solenoids. With this arrangement, it is stated, the equipment can be set in less than 10 sec. for checking strip of different thicknesses, in increments which may be as small as 0.0001 in.

Norton Press Demonstration

Demonstrations were held recently in the Engineering Centre, Birmingham, of equipment marketed by Frank Lewis & Co. (London), Ltd., 65 St. Paul's Churchyard, London, E.C.4, and emphasis was laid on the use of the 7½-ton highspeed hydraulic press built by Norton Tool Co., Ltd., Smallfield, near Horley, Surrey, for shaving operations.

Reference was made in an earlier article concerning this machine (MACHINERY, 94/267—4/2/59) to the fact that a valve in the hydraulic



With this typical set-up on the Norton 7½ntohigh-speed hydraulic press, portions of the edge of a computer key are shaved by a vibratory technique. Examples of the workpiece are seen against the lower bolster

system, which provides for selecting various operating cycles, can be set so that the ram is continuously reciprocated at high rates, over short stroke lengths. The ram speed can be varied up to 1,800 strokes per min., and is dependent to some extent on the stroke length, which can be as short as 0.01 in. Downward movement of the ram is reversed when the pressure in the operating cylinder exceeds a pre-determined figure, and for shaving, this pressure is set to provide for advancing the punch by an amount between 1/2 and 24th of the workpiece thickness per stroke. In this way, the work is pushed through the die in a series of steps, and a cutting—rather than a shearing-action takes place, which enables a high standard of accuracy to be obtained. It may be noted that the lowest pressure at which stable operation is obtained is slightly higher than the minimum available when the press is used in the conventional manner.

Shaving is carried out under manual control, by means of the lever at the right-hand side, and at the beginning of an operating cycle, the ram is advanced rapidly towards the work. Reciprocation is initiated automatically as a result of the punch contacting the work. Progressive downward movement is stopped when the collar mounted on the threaded upper portion of the ram contacts the top face of the bearing housing, but reciprocation continues until the control lever is released, whereupon the ram returns to the original position. To indicate the capacity, it is stated that when a cut of 0.005 in. deep is taken, edges totalling 20 in. long can be shaved on parts up to, say, 1 in. thick, in metal of 30 tons per sq. in. tensile Moreover, the rapid reciprocation can be superimposed on downward movement of the ram throughout the entire stroke length, namely, of

The press is being used by several firms for work of this nature, and the set-up demonstrated, which is shown in the accompanying illustration, provided for shaving portions of the edge of a computer key of 0.090-in. thick steel. Examples

of this component can be seen against the lower bolster of the tool, and the operating time was

approximately % sec.

Also shown was the prototype of an air-powered, second-operation slide feed unit, which is primarily intended for use with the Norton press mentioned earlier and provides for transferring parts to the working area. The unit was equipped with a magazine, for demonstration purposes, but is designed to accept parts supplied by any loading The feed carriage has a maximum stroke of 12 in., provision being made for adjustment at both ends for reducing this length, and the unit is controlled by valves that are actuated, at the end of the press cycle, by a cam block secured to When the carriage returns to the the ram. original position it operates another valve, and thereby causes the lever for initiating a single press cycle to be depressed by means of an air cylinder, which is mounted on a bracket bolted to the side of the machine frame. The unit is thus fully interlocked with the press for automatic operation. Provision is made for supplying compressed air to a clamp, for steadying unstable workpieces during the transfer movement, for example. The unit is mounted on a bracket, which is bolted to the machine frame, and can be adjusted vertically.

Other exhibits included the Australian-made Ace air-operated feed unit, which the company is now marketing in this country. This unit, which was shown mounted on a bench drilling machine, has capacity for feeding drills from 15 to 16 in. diameter, and can be set for either fully- or semi-automatic operation, using compressed air at pressures between 50 and 110 lb. per sq. in. The maximum stroke obtainable is 2 in. It is hoped to include a more detailed description of this unit in a forthcoming issue of MACHINERY.

Crane Mechanical Shaft Seals

A new mechanical shaft seal has been introduced by Crane Packing, Ltd., Slough, Bucks., a membercompany of the Tube Investments Group, and is intended for use at temperatures and pressures up

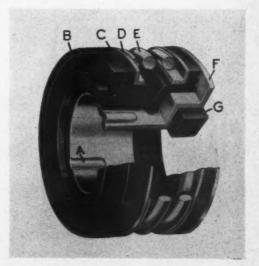
to 100 deg. C. and 75 lb. per sq. in.

Two forms are available, and the type 106, which is seen in the accompanying illustration, is designed for mounting on the shaft. A synthetic rubber ring, which is housed in an annular recess at the flanged end of a sleeve, is butted against a shoulder on the shaft, and serves to transmit drive to the unit. The seal face, which is made from either carbon or teeplelite, is driven by embossed longitudinal projections on the outside diameter of other end of the sleeve.

A single-convolution synthetic rubber bellows prevents seepage of fluid between the sleeve and the seal face, and is held in position by a compression spring which also maintains contact between the rotary face of the seal unit and the opposing stationary seat. With this arrangement, a certain amount of misalignment and axial play of the shaft can be accommodated, and compensation is made for wear of the seal face, without loss of efficiency. The unit can be supplied in four different sizes, with bores to suit shafts up to 1 in. diameter.

Designed for press-fitting, for example, in an annular recess in a formed casing through which a shaft projects, the type 106A unit is basically similar, but the seal is housed in a pressed metal retainer. Sizes are available to suit shafts up to % in diameter.

The metal components in either unit can be made from various ductile commercial metals, such as brass or Monel. The resiliently mounted stationary opposing seat can be supplied for use in conjunction with the units, and is made from cast iron, bronze, or Ni-resist.



The Crane type 106 mechanical shaft seal here shown is intended for use at temperatures and pressures up to 100 deg. C. and 75 lb. per sq. in.

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Engineering, Marine, Welding & Nuclear Energy Exhibition—I

The Engineering, Marine, Welding and Nuclear Energy Exhibition will be opened at Olympia, London, on April 20, and will continue until the evening of May 4. It will open each weekday at 10 a.m., and will close at 8 p.m. on May 1, 2, and 3, and at 6 p.m. on other days.

A wide variety of products will be on view on more than 500 stands, which will occupy a total floor space of 275,000 sq. ft. in the three main halls at Olympia, and, as on other recent occasions, equipment concerned with nuclear engineering will make an important contribution. Exhibits on a total of 43 stands on the ground floor of the Empire Hall will draw attention to recent developments which have taken place in connection with various branches of welding.

In the following pages, reference is made to some of the products that will be on view, and others will be considered in subsequent issues of MACHINERY.

Hancock & Co. (Engineers), Ltd., Progress Way, Croydon, Surrey. Stand No. 6, Row X, Empire Hall

The recently-introduced "lightweight" flame planing machine illustrated in Fig. 1, which will be shown by this company, enables cuts to be taken simultaneously on both edges and the ends of steel plates up to 12 ft. wide by 30 ft. long. If required, the guide rails for the gantries which carry the burner heads can be extended to enable longer plates to be handled. In addition to taking straight-line cuts, the machine can be employed for producing profile parts for shipbuilding.

The central gantry is traversed on the guide rails by a variable-speed motor, and carries two compound burner heads, which can be adjusted with the aid of tape-type scales to suit the width of the plate to be cut, so that the need for marking out is avoided. Compound burner heads for taking cuts on the ends of the plate are traversed on the outer gantries, again by variable-speed motors. Controls for the traversing motions, and switches for operating the solenoids for the burner heads, are grouped on a panel which is attached in a convenient position on the central gantry.

A new tube profiling machine, which will be on view, is intended for preparing the ends of branch pipes from 3 to 12 in. diameter for welding, and can be fitted with an attachment for cutting holes in main pipes. Branch and main pipes which have been prepared on the machine can be brought together to form T- and anglejunctions. A feature of the design is that the cam for controlling the cutting operation can be prepared on the machine from a drawing. number of drawings is supplied, from which templates can be pre-

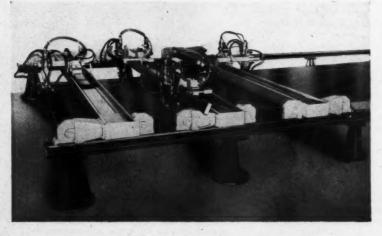


Fig. 1. The new Hancoline "lightweight" flame planing machine

pared for profile cutting pipes of different diameters within capacity of the machine. The ratio between the movement of the template follower and the cutter head can varied, so that, for example, the same template for preparing a 3in. diameter branch pipe and a 6-in. main pipe, to obtain a 45-deg. junction, can also be used for the preparation of branch and main pipes of 6 and 12 in. diameter. Steplessly-variable cutting speeds are provided by a fractional horsepower motor drive, and entire machine, which is self-contained,

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can be readily moved from one site to another. Also of interest will be the latest Hancoline oxygen profiling machine, fitted with an electronic tracer head, and the recently-introduced burner-height control system, which was described in Machinery, 97/1405—21/12/60. With this system, any change in capacitance between a ring which surrounds the burner nozzle, and the top surface of the workpiece, serves to operate a reversing fractional horse-power motor. The motor then drives a screw to adjust the burner head and ring assembly to maintain the required height.

British Federal Welder & Machine Co., Ltd., Castle Mill Works, Dudley, Worcs. Stand No. 2, Row Y, Empire Hall

This firm, which specializes in the design and production of resistance welding equipment, will show examples from their range of standard machines, also scale models and photographs of some of the large transfer-type welding lines which they have built.

For instance, there will be a scale model of a fully-automatic welding installation for the production of under-bodies for cars at the rate of 120 per hour. Certain component parts of the under-body are built up to form sub-assemblies which are then automatically fed into the main transfer line to be welded to other members. Another exhibit will be a scale model of the company's patented automatic clinching and welding equipment for the production of motor-car doors. Designed for handling doors at the rate of 120 per hour, this equipment

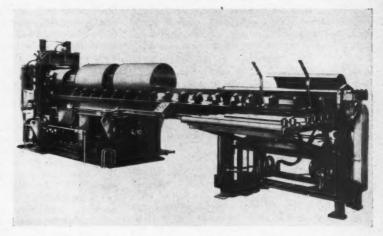


Fig. 2. Bodies for 45-gal. drums are produced on this British Federal machine from flat blanks at the rate of 400 per hour

incorporates multiple heads for welding the component parts at the pre-clinching stage, automatic clinching heads, and heads for post-clinch welding.

The machine illustrated in Fig. 2, which will be demonstrated, is designed for the production of bodies for 45-gal. drums from sheet metal blanks on a fully-automatic cycle, at the rate of 400 per hour. It will take blanks up to 42 in. long by 16 s.w.g., which are loaded on to a roller table at the righthand end of the machine, and are then formed to a cylindrical shape by means of rollers. forming has been completed, the bodies are passed, in turn, by way of a conveyor, through the combined sizing and 250-kVA. mash seam welding head at the left-hand end of the machine, to complete the production sequence. A feature of the welding head is that when the upper and lower disc-type electrodes have become worn for part of their width, they are automatically indexed transversely, so that fresh portions are brought into contact with the work. In this way, the formation of grooves in the faces of the electrodes is avoided, and the production of welds of uniform quality is ensured. If required, a crushing roll attachment can be fitted, to bring the weld flush with the internal surface of the body, as is necessary when the drum is to be lacquered.

Control equipment made by the company includes a fully-transistorized timer, incorporating printed circuits, and a sensitive overload protection relay unit, which is particularly intended for application to driving motors on machine tools. In addition, the British Federal range of D.P.1 unit-

type timer units for welding equipment, special plug-in timers, fully synchronous control equipment, automatic current control units, and automatic voltage compensators, will be represented.

Yates Plant, Ltd., Bedewell Works, Hebburn-on-Tyne, Co. Durham. Stand No. 3, Row U, Empire Hall

This company, which is a division of Baker Perkins, Ltd., Peterborough, will display a wide range of manipulator equipment associated with

the welding industry.

Two of the new Yates twin-pillar welding columns, of the type shown in Fig. 3, with retractable booms and complete with welding heads, will be seen in operation. The larger of the two units has a platform for an operator at the working end of the boom, and a 16-ft. extension and a 16-ft. elevating movement can be obtained. With the smaller equipment, which is suitable for use with either fully-automatic or semi-automatic welding heads, it is possible to weld automatically the internal seams of pipes down to 13½ in. diameter, by the submerged arc technique.

Rotators for pressure vessels, from 100 lb. to 100 tons capacity, will be demonstrated. The smaller units incorporate the firm's Autroset quick-setting system, and the larger units are based on a heavy-duty design that has been successfully employed for nuclear power plant work. All rotators are

fitted with anti-creep mechanism which ensures that the vessel does not follow a spiral path. Operation of this mechanism may be by hand or automatic, the latter arrangement involving electronic control by means of a patented scanner system which has recently been developed. To be shown for the first time, the Yates self-aligning, integral-bogie, travelling rotator has a low loading height and can be adjusted to take workpieces of any required length. A small, self-aligning stationary rotator is so designed that the frame can be opened out and fitted with an adapter, to enable vessels of various sizes to be accommodated.

A 5-ton capacity rocking manipulator, which will also be on view, is particularly intended for work-pieces with high centre of gravity, which cannot be accommodated on a normal trunnion-type machine. In addition, there will be a 1-ton power-operated manipulator with a maximum table tilt of 135 deg., and a 5-cwt. and 10-cwt. hand operated self-balancing manipulators.

The use of Yates equipment in connection with the welding of 350-ton heat exchangers will be illustrated by means of a scale model of the work-

shop at the Trawsfynydd site.

Broom & Wade, Ltd., P.O. Box No. 7, High Wycombe. Stand No. 8, Row H, Grand Hall

A range of stationary air compressors with outputs from 3 to 525 cu. ft. per min. will be on

view, including compressors for delivering oil-free air. The largest of these exhibits is the V500 2-stage doubleacting compressor, which delivers 525 cu. ft. of free air per min. when running at 485 r.p.m. It is of V-type, with cylinders at 90 deg., and the regulator in the air control system is stated to be accurate within ±1 lb. per sq. in. over all variations of load. High efficiency and economy of floor space are other advantages claimed for this compressor.

Pneumatic tools to be displayed will include the Aro - Broomwade series of lightweight screwdrivers, nut-setters,

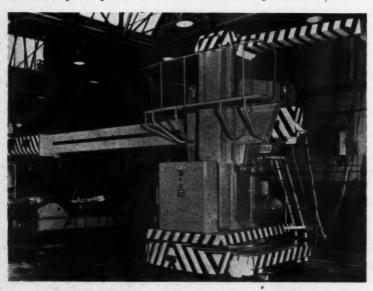


Fig. 3. Yates twin-pillar welding column with retractable boom

and runners, which are available in direct-drive, forward rotation, and reversible types with adjust-able clutches. Other exhibits will include Minihoists of ½ and 1 ton capacity, together with multipurpose Par-a-matic tools for various production operations.

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Renold Chains, Ltd., Wythenshawe, Manchester. Stand No. 6, Row H, Grand Hall

This company will show a selection of Renold transmission chains from 0.25- to 4-in. pitch, together with a range of stock drives. Chains for camshaft and auxiliary drives for diesel engines will be included, also examples from the company's range of conveying and elevating chains with breaking loads from 3,000 lb. to 85,000 lb., and Coventry Mark 5 malleable replacement chains with special attachments. There will also be power transmission accessories, such as chain and flexible couplings and chain tools.

Accuracy of manufacture of Renold precision roller chains will be demonstrated by means of a working model, and other displays will be concerned with the use of Renold Sprag clutches for indexing, back-stopping and free-wheeling, and the recently-introduced Renold RL (reversible locking) clutches. The latter can be employed for position control, the elimination of torque feed-back, and for reversible back-stopping.

A cut-away view of a typical RL clutch is given in Fig. 4. At present, the standard range comprises six basic sizes which are available with either ball or sleeve bearings. Outside diameters range from 37 mm. (1·46 in.) to 160 mm. (6·3 in.) and torque capacities from 6 lb.-ft. to 2,500 lb.-ft. The clutch has a circular outer race and two coaxial inner races which act as controller and follower. Two sets of locking elements are mounted between the follower and outer race, one set being arranged for clockwise, and the other for counterclockwise driving. Slight angular movement of the controller actuates a series of shoes which unlocks one or other set of elements, and thus provides for reversibility of the drive.

For position control and anti-feed-back applications, the outer race is fixed and the controller can drive the follower in either direction. When the controller is stationary, the follower is locked in both directions. Typical applications include steering gear, where the clutch prevents feed-back of torque to the control wheel. On hoists and lifts, the required position is held positively without the need for external braking. In control systems, for example, for machine tools and aircraft wing flaps, the clutch permits accurate settings to be made which cannot be disturbed by external forces or vibration.

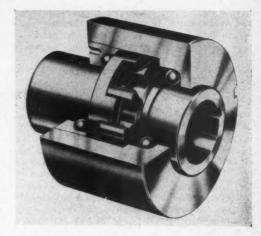


Fig. 4. A cut-away view of the Renold RL (reversible locking) clutch

When the unit is employed as a reversible backstop, the follower is fixed, and the outer race will lock or over-run the follower in either direction of rotation. A 5-deg. movement of the controller reverses the direction of free-wheeling.

Henry Pels & Co., Ltd., 32-38 Osnaburgh Street, London, N.W.I. Stand No. I and 2, Row E, Grand Hall

A new MC 10 universal "Steelworker" machine for punching, shearing, cropping and notching operations will be exhibited by this company. It has a capacity for cutting mild steel plates up to % in. thick, and cropping angles and T-sections up to 3 by 3 by % in., and bars up to 1% in. diameter. Holes up to 1% in. diameter can be pierced in % in. thick mild steel plates, and the machine can be equipped with interchangeable tools for notching square and mitre shapes.

Attention may also be drawn to the type FB.13 and type FB.13 SP open-ended shears which have been added to the Pels range. The former machine can be fitted with interchangeable upper shearing blades which have cutting edges inclined at angles of 2 and 3% deg., and enable mild steel plates up to 20 in. wide, with maximum thicknesses of % and % in., to be cut. Upper shearing blades which have cutting edges inclined at angles of 2, 3%, and 5 deg. can be provided for the type FB.13 SP machine, for cutting mild steel plates with a maximum width of 14 in., and thicknesses up to %, %, and % in.

Both machines can be fitted with shearing

blades for cutting angles, T-sections and round and square bars. If required, the shearing blades can be removed from the machine, and press tools may then be mounted on the ram and the bed, to enable piercing, blanking, notching, and nibbling operations, for instance, to be carried out. An adjustable hold-down unit is fitted.

Drive is taken from a 10-h.p. motor, through V-belts to the flywheel, and thence by a 3-jaw clutch and reduction gearing to an eccentric shaft. A heavy hardened pin on this shaft engages a hardened pressure block in the ram slide, which has vertical movement. The cycle for singlestroke working is started by depressing a knob, and there is a second knob which can be set to give continuous operation. Alternatively, the machine can be controlled by a pedal, or each working cycle can be automatically started by the action of bringing the bar to be cut into engagement with an end stop. A maximum force of 170 tons is applied to the work during the shearing cycle, and the machine has an operating speed of 30 strokes per min.

In addition, there will be power presses, precision measuring equipment, and other items of Continental origin, for which the company is the distributor in the United Kingdom. These exhibits will include the German-made Burger type DO 4 air-operated impact press (see MACHINERY, 97/347—10/8/60), and a C.M.B.G. (Italian) 40-ton capacity inclinable crank press. The latter has an operating speed of 200 strokes per min., and the working stroke can be varied from % to

Particular attention may be drawn to examples

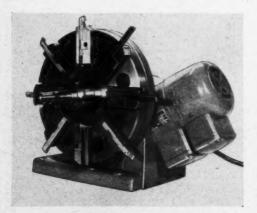


Fig. 5. This Beer indexing toolpost for a lathe is fitted with a boring bar and a holder for eight radially-mounted tool-bits

from the extensive range of precision measuring equipment made by Carl Mahr, Esslingen, and their associates Feinpruef und Pruetgeraete, Goettingen, Germany. Elmillimess, Multimess, and Elmillipneu electro-mechanical and electropneumatic comparators, it is stated, enable workpieces to be checked with accuracies from 0.0005 down to 0.000005 in. Air gauging equipment in the Millipneu range can be operated in conjunction with dial-type and column-type indicating heads, which provide magnifications from 1,000 up to 20,000 x. This equipment is usually operated from a compressed air supply of 28 lb. per sq. in., and can be supplied with multiple measuring heads, for example, for checking bores for centre distance, and workpieces for eccentricity, and squareness of bores with end faces. The display will also include Inwi adjustable dial indicator screw plug gauges, and examples from the Mahr range of gear testing machines. In addition there will be the Feinpruef Tricurat precision surface grinder (MACHINERY, 88/1141-22/6/56), and the type S.H. 300 relieving lathe.

Equipment made by Wilhelm Beer, Wiesbaden, Germany, includes a motor-driven indexing toolpost for use on a lathe. This equipment can be supplied with interchangeable holders to take a maximum of eight tool-bits arranged radially, and, in addition, a boring bar can be mounted in the indexing spindle, as shown in Fig. 5. The motor for indexing the spindle to bring the different cutting tools into use, as required, can be controlled by push-buttons or as part of an automatic working cycle on the lathe.

Gear units of compact design, which will be on view, are particularly intended for use on machine tools, and speed changing is effected by axial movement of a plunger within the hollow driving shaft. As a result, a set of steel balls rides up a taper on to an enlarged-diameter part of the plunger and into engagement with the bore of a gear which is thus brought into use to provide the desired speed. At the same time, a second set of balls moves down another taper at the opposite end of the enlarged-diameter portion, and in this way is brought out of engagement with the bore of another gear, which gave the speed previously employed. The Beer Sentinel system which will be displayed, can be arranged to give visual or audible signals when different cutting tools on transfer machines have been in operation for predetermined numbers of working cycles. If tool changing is not then carried out before completion of another pre-determined number of operating cycles, the transfer machine is stopped.

The display will include examples of Ringspann (German) work-holding chucks (MACHINERY,

93/841—8/10/58), also a new steplessly-variablespeed gear unit, and clutches of various types.

Allspeeds, Ltd., P.O. Box No. 43, Clayton-le-Moors, Accrington, Lancs. Stand No. 3, Inner Row, Gallery, National Hall

The Kopp variators to be shown by this company transmit constant power and give steplessly-variable speeds between a minimum of one-third and a maximum of three times the input speed. Made in sizes from 1/33 to 15 h.p., they are available either with free shaft ends, or flange-mounted on electric motors or reduction gears, and different arrangements can be provided for varying the

speed settings.

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Angular contact bearings have now been provided for the shaft assemblies of all sizes of unit, without any change in the outside dimensions. Each of the new shaft assemblies is fitted with one cylindrical roller bearing, and for units up to 1½ h.p., a single angular contact bearing. For the larger units, matched pairs of angular contact bearings are used. As a result of this development, it is stated, there has been an improvement in overall efficiency, and a considerable increase in the maximum permitted running speeds. Space saved by the elimination of the thrust race previously employed can be used to accommodate a small oil pump on the shaft, which enables the variator to be adapted for almost universal mounting.

There will also be an electronic test rig for determining the constancy of the ratio of the input and output speeds. This equipment incorporates a J. Langham Thompson digital counter which shows the ratio by means of illuminated numerals on a display panel. Another exhibit will be the Mark 3 speed corrector unit which can be employed in connection with many winding operations where

constant linear speed is required.

Metalastik, Ltd., Evington Valley Road, Leicester. Stand No. 11, Outer Row, Gallery, Grand Hall

Duolastik flexible couplings, which prevent resonant torsional vibration in marine engine and propeller shaft systems, are to be shown for the first time in a range of sizes to transmit 57 to 400 b.h.p. per 100 r.p.m. Other Metalastik flexible couplings include the Double-Cone and Bi-Cone for marine applications, and the disc, barrel and trailing link types for general industrial drives.

Anti-vibration mountings will be exhibited in a variety of designs for loads from a few ounces to several tons. These include the Cushyfoot range, an example of which is illustrated in Fig. 6, with the protective cover "ghosted" to show the rubberbonded-to-metal springs which are loaded in shear and compression. For roll grinders, forging



Fig. 6. Metalastik Cushyfoot mounting which can be supplied with individual load carrying capacities up to 3,500 lb.

hammers and other very heavy machines, there are carpet mountings, whereby, it is claimed, up to 90 per cent of ground vibration can be eliminated.

Flexible bearings for oscillating movements without lubrication, will include Ultra-duty and Spherilastik types. The latter is capable of supporting heavy radial and axial loads, and permits considerable angular movement in all directions.

Rockweld, Ltd., Commerce Way, Croydon, Surrey. Stand No. 2, Row U, Ground Floor, Empire Hall

The Rockweld series 2 Comet equipment for semi-automatic welding with flux-cored wire incorporates a number of improvements. This machine can be used with any conventional a.c. or d.c. power source of 70 volts, open circuit, and constant potential d.c. power sources are also suitable. Additions to the machine, to enable fullyautomatic welding to be carried out, are shown applied to two self-propelled carriage types. On one of these machines, a Comet wire nozzle is supplied from a relatively short length of feed tube at the extremity of an adjustable arm on the carriage pillar. This arrangement permits the nozzle to be located at angles suitable for welding a wide variety of joints. Provision is made for adjusting the angle and lateral displacement of the nozzle while welding is in progress. The second machine, known as the Duomatic, has been specifically designed for the attachment of stiffeners in ship fabrication. Provision is made for intermittent welding, to avoid buckling due to weld contraction.

A machine known as the Vertomat, for the vertical welding of plates from ½ in. thick upwards, will be shown for the first time. With this machine two water-cooled shoes are employed to enclose

the weld metal between the plates, and the arc is shrouded with CO2. No slag is used with this process. It is claimed that the operation can be carried out at four times the speed of manual welding. A welding head carriage, which is mounted on vertical rails, incorporates the control for vertical movement, the wire feed, and an oscillating mechanism. The latter is required when welding plate thicknesses of 1% in. and over. Pressure switches and relays ensure that welding is stopped in the event of failure of the CO2 gas supply to the weld, or cooling water to the shoes. Vertical traverse speed, welding current and voltage, and positioning of the weld nozzle can all be controlled by the operator during welding.

The Vertomatic Electroslag welder (MACHINERY 95/548-16/9/59) for thick plates will also be shown, together with the Autopak submerged arc equipment with a new fillet welding attachment, and examples of manual welding plant.

Deloro Stellite, Ltd., Highlands Road, Shirley, Solihull, Warwicks. Stand No. 3, Row W, Empire

On this stand there will be displays and demonstrations to indicate how the life of components which are subjected to severe wearing conditions can be substantially extended by the use of Stellite. These alloys are now available in powder and rod forms, or as castings produced by a variety of processes, and examples of components for the iron



Fig. 7. A Stellite alloy is here being applied to a typical component by the spray-fuse process

and steel, petroleum, chemical, textile, and other industries will be shown.

The demonstrations will cover spray-fusing, as shown in Fig. 7, powder welding, fusing by induction heating, and gas welding torch deposition of the Stellite. Exhibits will also include Stellite cutting tools of both solid and tipped types, for various purposes, including turning on automatics, also capstan and centre lathes, and milling.

Turner Brothers Asbestos Co., Ltd., P.O. Box No. 40, Rochdale, Lancs. Stand No. 2, Inner Row, Gallery, Grand Hall

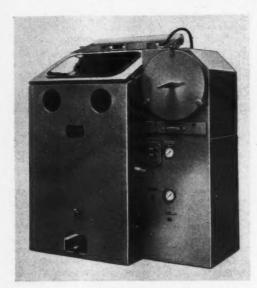
Power transmission beltings for a variety of purposes will be featured on this stand, with particular emphasis on standard and premium V-belts, flat transmission, and whipcord belting. Demonstrations will be given of the applications of the recently-introduced Poly-V transmission belts (MACHINERY, 96/676-23/3/60) which eliminate matching problems. These belts are made in J-, L-, and M-sections, with rib widths of 32, 16, and % in. It is stated, for example, that a 32-rib, M-section belt, 12-in. wide, replaced 13 separate V-belts on a precision centre lathe, and enabled the pulley width to be reduced by some 30 per cent, so that the need for an outboard bearing was avoided. A J-section belt will transmit 10% h.p. for each inch of width over a 4-in. diameter pulley running at 4,000 r.p.m.

In addition, samples of rubber and P.V.C. conveyor belts for various purposes will be displayed, including the latest types which incorporate synthetic fibres such as Nylon and Terylene. Other products on view will include Durestos resinated asbestos mouldings, Duraglas glass fibre reinforce-

ments, and P.T.F.E. components.

Vacu-Blast, Ltd., Wellcraft Road, Slough, Bucks. Stand No. 6, Row W, Empire Hall

The Vacu-Blast range of mobile dustless shot blasting equipment has recently been extended by the introduction of the Majorette unit, which is operated entirely by compressed air, and is particularly intended for use on outdoor sites. equipment will be demonstrated in conjunction with a crawler unit for removing rust and scale from flat steel plates. The storage hopper will take a charge of angular, chilled, cast iron abrasive grit weighing about 4 cwt., which enables shot blasting to be carried out continuously for a period of 25 to 30 min. When the machine has been stopped, removal of debris from the grit is carried out automatically in a period of about 50 sec., and as soon as this operation has been completed, shot blasting can be resumed. Abrasive grit is delivered to the work through a flexible hose and a %-in.



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Fig. 8. With the Vacu-Blast Dry Honer unit here shown, abrasive grit for cleaning moulds, for example, is delivered to the work by compressed air without the need for liquid carriers

diameter tungsten carbide nozzle, under the control of a valve on the gun. As with other machines in the Vacu-Blast range, many of which have already been described in Machinery, debris and spent abrasive from the working area are passed, by way of a second hose, to the reclaiming unit for separation.

Also designed for operation by compressed air, the Minor shot blasting equipment is particularly intended for preparing steel plates for welding, and for removing slag from the work when welding has been carried out. In addition, the company's Medium and Midget shot blasting machines will be displayed.

Of special interest will be the recently-introduced Dry Honer unit, illustrated in Fig. 8, which, it is reported, is finding numerous applications for cleaning of moulds for rubber components, also turbine rotors and stators. This equipment will handle abrasives of spherical and angular form in sizes down to 600 mesh, which are delivered to the work by compressed air without the need for liquid carriers. It is available in three sizes, the largest of which has a work cabinet with internal dimensions of 36 in. wide by 36 in. deep by 24 in. high. A storage hopper, a feed valve, and a reclaiming unit for the abrasive grit are connected

to the cabinet, which is illuminated by a built-in lamp, and is fitted with glove attachments for the operator's hands.

George Angus & Co., Ltd., Oil Seal Division, Coast Road, Wallsend, Northumberland. Stand No. 3, Row AA, First Floor, Empire Hall

Examples from this company's range of Gaco products will include M.I. oil seals for shafts, which are available in inch and metric sizes; "O" rings and other hydraulic packings made from silicone rubber; diaphragms, bellows, and tubing; and mouldings which are representative of a range of items made to customers' requirements.

Reference may also be made to Bellofram rolling diaphragms, which provide for frictionless sealing of pistons. Star "tolerance" rings (see Machinery, 92/155—17/1/58) are intended to be interposed between shafts and mating bores to provide the equivalent of an interference fit for transmitting drives. Available in a variety of sizes up to 3 in diameter, these rings are made from spring steel in strip form with a central corrugated portion, which is compressed during assembly, so that a tight fit is obtained simultaneously on the shaft and in the bore.

In addition, the display will include tape, sheet, tubing, mouldings, and machined parts in P.T.F.E. fluorocarbon plastics.

Portable Welders, Ltd., Castle Mills, Buckingham. Stand No. 8, Row V, Empire Hall

Fourteen welding guns will be shown on this stand, ranging from the small, portable type S.12, with a capacity for welding 2 by 14-s.w.g. mild steel, to the air/hydraulically-operated type S.125, capable of welding 2 by %-in. thick mild steel, or 2 by 14-s.w.g. aluminium. A special type S.80 gun, to be displayed, has two 6-tt. floating secondary cables, one of which terminates in a pistol-grip electrode. This gun has been developed primarily for the repair of stainless steel heat insulation blankets, but it also has other applications.

Mention may also be made of the new type S.120 hand-operated production spot welding gun, which is conservatively rated at 10 kVA for a 20 per cent duty cycle. The gun is normally capable of welding 2 by %-in. thick mild steel sheets, and it is also suitable for welding non-ferrous materials. A wide range of water-cooled arms is available, the standard types having 8-, 12-, or 18-in. reach, and 4%-in. throat depth. Special arms can be supplied to suit particular requirements, and provision is made for easy changing. Welding force is applied through toggle mechanism, and forces up to 600 lb. can be exerted with the 8-in. arms.

A class H silicone-insulated transformer is incor-



Fig. 9. The FARARC 240 series 3 toroidallywound arc welder

porated, and the gun is intended for use in conjunction with the firm's Mark 4 or Mark 5 electronic timer/contactor units. A spring-loaded counterbalance is available, and the gun can be mounted on a sling arranged to give either a 180 deg. or 360 deg. turning movement. A pedestal stand can also be supplied which has a compartment to accommodate the timer unit, and separate switching arrangements actuated by pedal.

A toroidally wound, class H insulated arc welder, known as the FARARC 240, series 3, and illustrated in Fig. 9, will also be shown. It has a continuous rating of 200 amp., a maximum of 300 amp. being available, and weighs only 95 lb. Coupled to this equipment will be a new stud welding gun,

for studs up to 1/2 in. diameter.

Developed to enable transient voltage surges on the company's own products to be eliminated, a detector will be shown, which, when coupled to a circuit, allows the actual surge to be observed on a cathode ray oscilloscope as a fixed image. Definite condenser and resistance values can then be brought into circuit until the surge is eliminated. In addition, a wide range of spot welding electrodes and are welding accessories will be on view.

Accles & Pollock, Ltd., Oldbury, Birmingham, Stand No. 47, Inner Row, Gallery, Grand Hall

Examples from the company's range of seamless tubing in stainless steel and other metals will be exhibited. Small-bore precision tubing will include fuel pipes for diesel engines, also high-pressure multi-bore, composite, capillary, and Bourdon, tubes, and tubing for instrument pointers.

Seamless drawn tubing in a variety of crosssectional shapes will be on view, together with examples of tubing in zirconium, tantalum, titanium, molybdenum, vanadium, and niobium. There will also be seamless stainless steel flexible tubing, thin-wall tubing, flexible joints, and finned and extended surface tubing. In addition, the display will include machined tubes for hydraulic lifting equipment, with high-quality surface finish in the bores.

A. & S. Osmond, Ltd., 13 Dowry Square, Bristol, 8. Stand No. 11, Row AA, First Floor, Empire Hail

This company will be exhibiting a representative range of their abrasive wheel cutting-off and sawing machines. A new design of sawing machine, known as the type 7, which will be on view, is fitted with a pedal-operated vice arranged for horizontal motion. There is also a retractable chute for discharging the cut blanks. Another recent development is a type C16/30 machine equipped with pneumatically-operated clamp bars for the work. This type of clamp, it is stated, covers a wide range of material sizes without adjustment, and it can be fitted to existing machines.

Two sizes of laboratory machines for cutting



Fig. 10. The Osmond type 5M8 cutting machine for metallurgical specimens

metallurgical specimens will be demonstrated, one of which, the type 5M8, is shown in Fig. 10. These machines have been specially designed to provide for cool cutting, and to produce a good finish without change in the material structure, so that a minimum amount of work is necessary for the final preparation of the specimen.

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Hilmor, Ltd., Caxton Way, Stevenage, Herts. Stand No. 6, Row K, Ground Floor, Grand Hall

This company will display an extensive range of hand-operated, hydraulic, and electro-mechanical machines for bending tubes, angle and section material, and extrusions. Special prominence will be given to a general-purpose small-radius mandrel bending machine with motor drive, and to a new design of semi-automatic, motor-driven machine for repetition work. Both machines, it is stated, will produce full-bore bends, of standard and small radii, in cold, unfilled tubing.

The Hoyt Metal Co. of Great Britain, Ltd., Deodar Road, London, S.W.15. Stand No. 25, Outer Row, Gallery, Grand Hall

Anti-friction metals, and precision bearings and bushes in bronze, steel/white metal, and steel/copper lead alloys, will be shown on this stand as representative of the company's range of products. Other items to be displayed will include rods, tubes, and components produced from phosphor bronze and lead bronze by centrifugal casting and die casting. There will also be examples of components produced by press tools made from Kirksite A metal. It is reported that in addition to press tools, this alloy is being used on an increasing scale for moulds for the production of parts in plastics and glass fibre materials.

On view at this exhibition for the first time, will be the Hoyt Mark 1 Bondmeter instrument shown in Fig. 11, which is intended for carrying out tests for adhesion between a steel bearing shell and a lining of one of the white metals from the company's No. 11 range. The instrument is pre-set with the aid of a reference standard, and when the probe is passed over the surface of the bearing lining, as shown, readings are obtained on a galvanometer, which indicate the quality of the bond. In this way, any portions of the lining which have not been bonded to the shell because of faulty tinning, or blisters due to escape of hydrogen from the shell, for example, can be readily detected. The electrical conductivity of the bearing shell should not be less than that for the lining, and, in general, the thickness of the latter should not exceed 0.1 in. The instrument cannot be employed for checking bearings with shells made from certain types of cast iron which have low electrical con-



Fig. 11. Hoyt Mark 1 Bondmeter instrument for testing adhesion between a steel bearing shell and a white metal lining

ductivity. It is intended for operation on an a.c. supply of 110 or 120 volts, and weighs 21½ lb.

Dowty Rotol, Ltd., Arle Court, Cheltenham, Glos. Stand No. 10, Row BB, First Floor, Empire Hall

This firm's exhibits will include the Vardel highpressure piston-type pump for industrial applications, which provides hydraulic pressures up to 4,000 lb. per sq. in. The output at 1,500 r.p.m. is 2·4 gal. per min., and is proportional to speed up to 3,000 r.p.m. A control mechanism is incorporated which reduces output flow to zero at a pre-determined pressure, and maintains a high holding pressure with low power consumption, without overheating of the fluid. A fixed delivery version of this pump is also available.

Hydel solenoid-operated 3- or 4-way valves to be shown are suitable for pressures up to 4,000 lb. per sq. in. at temperatures ranging from -54 to +70 deg. C. The solenoids have a maximum rating of 0-4 amp. and the valves permit high flow rates with only a small pressure drop.

A power pack will be shown which incorporates a Vardel pump driven by a 7½-h.p. motor running at 1,500 r.p.m., and a hydraulic tank of 15-gal. capacity. Alternatively, a 10-h.p. motor running at 3,000 r.p.m., can be provided. The motor and tank casings are finned for cooling purposes during normal on/off operation. For continuous running, or sub-tropical conditions, the tank can be immersed in water. The complete power pack is

42 in. high by 22 in. diameter, and weighs 325 lb.

In addition to hydraulic equipment, the company will show electrical units for automatically synchronizing the speeds of two or more engines or other rotating mechanisms. This synchronizing equipment consists, essentially, of a small 3-phase alternator fitted to each of the units to be synchronized, including a selected "master" unit, and corrector motors incorporated in the control systems of the "slave" units. These motors automatically adjust the "slave" units to the same rotational speed as the "master."

Watson & Sons (Electro-Medical), Ltd., East Lane, North Wembley, Middlesex. Stand No. 7, Row W, Ground Floor, Empire Hall

Demonstrations of the Xeroradiography process recently introduced by Rank-Xerox, Ltd., for which the above company market equipment, will be given on this stand. This process, it is stated, enables X-ray pictures to be obtained within 15 sec. of an exposure being made, and without the use of conventional X-ray film. The sensitive element for detecting the X-ray image is a thin layer of photoconducting selenium on a metal backing plate. This plate is sensitized by giving the selenium surface a uniform electrical charge. On exposure to X-rays the selenium conducts the charge to the backing plate to an extent which depends on the X-ray intensity, resulting in a pattern of charges which is made visible by blowing charged powder against the selenium. The pattern is then observed under side lighting in a viewer which screens off extraneous ambient light. A built-in 35 mm.

Fig. 12. Andrex 200-kV. portable X-ray unit

camera provides a permanent record of the image.

After the image has been viewed, the powder is removed by a revolving brush and the plate can be used again. The plate has a sensitive area of 13 by 8½ in., and its average life is about 1,000 exposures. Cost of making X-ray pictures by this process is said to be considerably less than for normal radiography, and good resolution is obtained. Conventional X-ray apparatus is used.

Among the company's exhibits there will be a comprehensive range of Andrex portable X-ray units, including a new 260-kV. equipment which can be used for conventional or 360 deg. radiography and will operate continuously at 5 mA., a built-in water cooling system being provided. An Andrex 200-kV. portable X-ray unit is shown in

Fig. 12.

A range of isotope containers for various industrial applications will also be on view, and as distributor in this country for Atomic Energy of Canada, Ltd., the company can supply data concerning high specific activity cobalt-60 and iridium 192, which are now available. A selection of Machlett X-ray tubes for radiography and fluoresseent analysis will be displayed, together with photographs of the Daystrom X-ray thickness gauges for use in rolling mills, for which the firm is agent.

The Rawlplug Co., Ltd., Rawlplug House, Cromwell Road, London, S.W.7. Stand No. 4, Row K, Ground Floor, Grand Hall

In addition to their extensive range of Rawlplugs, this company will show examples of

Rawlbolts. These heavy-duty, allmetal, expansion bolts are made in two types, namely, "loose bolt," and "bolt projecting," the former being intended for floor, and the latter for wall fixings. There is a wide range of sizes, from in. to 1 in. diameter, and types with hooks, eyes, pipe hangers, and other fittings are available. Reference may also be made to the duplex stud anchor, for use with It incorporates a double studding. cone which ensures that thrust is uniform over the entire length of the hole in which the fixing is being made.

Other exhibits will include Rawlset anchors which can be supplied in two sizes to take \$\frac{45}{24}\$- and \$\frac{1}{45}\$-in. diameter Whitworth screws. This unit can be sunk deep into the material, or located near the surface, and it is particularly intended for fixing door frames, metal windows, and lighting fittings.

Among the Rawlplug tools, attention may be drawn to the drill hammer attachment for converting an electric drill into a power hammer. At each revolution of the tool a blow is struck, and there are light, medium, and heavy settings. Vibroto 3 in 1 electric power tool, which will also be on view, gives a high rate of vibration combined with rotation, for boring holes in concrete with specially-made Vibroto hard-metal tipped drills. The tool can be set for light or heavy blows, or for free rotation when Rawlplug Durium drills are being used. Drill shanks up to 4-in. diameter can be held in the chuck.

In addition, the company will show the Rawlplug 2-speed type RP2 electric drill with selftightening chuck. This tool has a capacity of in., and speeds of 420 and 1,200 r.p.m. are obtainable. The Rawlplug De-Speeder, which will also be displayed, provides a simple means of reducing the spindle speeds of electric tools by a ratio of 4 to 1.

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W. & T. Avery, Ltd., Soho Foundry, Birmingham, 40. Stand No. 3, Row H, Grand Hall

The Avery type 7108 CCG, 1,200-lb. capacity, universal testing machine, illustrated in Fig. 13, will be shown fitted with a servo-operated autographic recording unit of new design. Speed of response of this unit is such that the full scale can be covered in less than 2 sec., and loads applied to the test piece in either direction, and the resulting extensions obtained, can be recorded. Because the unit is servo operated, it does not affect the accuracy of the extensometer, and may be mounted remotely if required.

Another exhibit will be the type 7110 DCJ universal testing machine, fitted with a hightemperature furnace and associated control equip-Single or multiple furnace units can be ment. supplied for this machine, which enable tests to be carried out on pieces at temperatures up to 900 deg. C. It can be used in conjunction with an auto-graphic recorder which provides for quickly determining the proof stress of the test piece, and plotting load-extension curves at mag-

nifications up to $1,000 \times$.

With the firm's type 6406 "visual" hardness tester, an image of the impression made in the test piece by the indenter is projected optically on to a screen, usually at a magnification of 70 x. feature of the latest instrument, which will be shown, is that a magnification of 350 x can also be obtained, and it incorporates an improved shutter-type measuring system, which enables very small impressions to be checked to a high degree of accuracy.



Fig. 13. Avery type 7108 CCG universal testing machine

Among other products to be exhibited may be mentioned the type 6402 Rockwell hardness tester, and a testing machine for coil springs, to which reference was made in MACHINERY, 94/903-22/4/59. A type 7207 dynamic balancing machine will be shown fitted with the new Vectormeter equipment, whereby the unbalance in the component being checked is indicated by means of a spot of light which is shown on a special chart, as was described in MACHINERY, 96/1633-29/6/60. The radius of the spot from the centre of the scale represents the amount of unbalance, and the position of the spot indicates its angular location.

John Holroyd & Co., Ltd., Milnrow, Lancs. Stand No. 2, Row DD, First Floor, Empire Hall

This company will show various examples from the range of H-type worm gear units which includes under-driven, over-driven, vertical, and doublereduction designs, also units to B.S. 3027/1958. F-type units, which are made in three sizes, of 11/4-, 11/4-, and 21/4-in. centres, will also be on view, together with the 24-in. Verso unit, and motorized units. The work of the contract gear cutting department will be represented by examples of worm, bevel, spur, helical, and double-helical gears, and there will also be screws, nuts, shafts, helical compressor rotors and high lead-angle screws.

Foundry products will include centrifugally-cast worm-wheel 'blanks in Super-Holfos phosphor bronze, and medium and large bearing bush blanks and rings, also centrifugally cast, in phosphor bronze and leaded bronze. For smaller bushes and bearings there will be cored bars of Holfos Spuncast phosphor bronze, silicon bronze, and leaded bronze, also continuously-cast Holfos bronze bars and tubes, in long lengths.

Shell-moulded castings in Holfos bronze and other copper alloys, including aluminium bronze, manganese bronze and leaded gunmetal, will be displayed, together with examples of finish-machined components. In addition there will be standard bearing bushes to B.S. 1131: Part 1, 1955, made from Holfos bronze, and a selection

The Bronx Engineering Co., Ltd., Lye, Nr. Stourbridge. Stand No. 4, Row A, Ground Floor Grand Hall

of forgings and blanks in carbon and alloy steels.

Exhibits on this stand will include the series 200-8-H, 200-ton electro-hydraulic press brake shown in Fig. 14. This machine has a capacity for bending mild-steel plate up to 10 ft. wide by % in. thick, or, between the frame members, 8 ft. wide by 75 in. thick. The frame is of heavy steel plate construction, and the bottom beam is mounted on half-moon pivots, and bolted on the

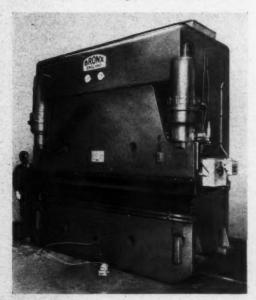


Fig. 14. Bronx series 200-8-H, 200-ton electrohydraulic press brake

centre-line of the main housings. Trunnion mounting of the hydraulic cylinders ensures alignment of the top beam and slideways. Pressure oil is supplied by a Towler pump unit, and the press is controlled by a foot-operated switch on a trailing cable. Grouped selector switches and a pressure control valve permit setting for automatic reversal on reaching a pre-set tonnage, or for an indefinite dwell at any pre-set tonnage with a locked system and pumps unloaded. The stroke can readily be varied to suit the work, and on the down stroke the beam can be inched by foot control. A selector switch is provided for setting for continuous or single-stroke operation.

Another machine on view will be a series PBG.1012 3-roll pyramid-type plate bending rolls for mild steel plate up to 12 ft. wide by 1½ in. thick. The diameters of the top and bottom rolls are 20 in., and 16 in., and the machine has a 60-h.p. main driving motor. Top roll adjustment is obtained through worm gearing located in the main housings, the drive being taken from a 30-h.p. reversing motor. A clutch in the transmission permits the top roll to be tilted for taper rolling. The machine has a rolling speed of 15 ft. per min.

A Bronx series T.CR.2. multi-cross roll tube

A Bronx series T.CR.2. multi-cross roll tube straightening machine, which will be shown, will handle ferrous and non-ferrous tubes from is to in diameter. The hardened, alloy-steel rolls are mounted in roller bearings. There are three upper and three lower rolls, and each set is driven by a 2-h.p. motor.

Reference may also be made to the Bronx allsteel hand-operated press brake which is available in 24- and 36-in. sizes, and is arranged for bench mounting. Work up to 17 in. wide is admitted between the housings, and the stroke of the top beams is 2 in.

Hirst Electronic, Ltd., Gatwick Road, Crawley, Sussex. Stand No. 3, Row X, Ground Floor, Empire Hall

A comprehensive range of resistance and projection welding machines, designated types H.V. and J.V., will be on view. These machines are intended for operations on a repetition basis, on components for electrical and electronic equipment. The accompanying Fig. 15 shows a 25-kVA., 8-station projection welder with synchronous timer, for welding silver contacts on to backing strips at the rate of 1,000 per hour.

Cycle counters, current meters, and a cycle counter combined with a current meter will also be displayed, together with a resistance welding machine for use in connection with plastics coated steel. Other exhibits will include a range of synchronous and non-synchronous timing controls,

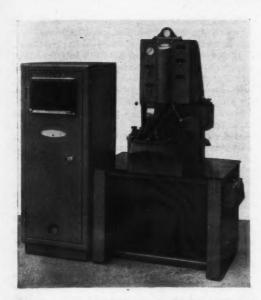


Fig. 15. Hirst 25-kVA., 8-station projection welder for silver contacts

hand welding tongs, precision resistance welding heads, turn-tables, air-conditioned welding and assembly benches, a range of welding contactors with ratings from 50 to 1,200 amp., and saturable reactors for close control of electric furnaces.

Shipston Engineering Co., Ltd., Shipston-on-Stour, Warwicks. Stand No. 40, Outer Row, Gallery, Grand Hall

There are now four machines in the Sundstrand range of compressed air sanders, two of whichthe twin pad type 1000 and the single pad type SP101-have reciprocating motion, whereas the single pad types OS700 and OS800 have orbital motion. All machines are suitable for wet and dry sanding, and can be fitted with a variety of pads to suit the work to be performed.

The Norgren range of compressed air equipment includes air filters, pressure regulators, Oil-Fog and Micro-Fog lubricators, and Mistcool cutting lubricant systems. Among recently-introduced units to be shown, attention may be drawn to the type 73AC filter regulator, as described in Machinery 98/857—12/4/61. This unit, which is available in 14- and 15-in. pipe sizes, is said to combine the high filtering efficiency of the firm's standard range of air filters, with the flow and regulation characteristics of the standard pressure regulators.

Reference may also be made to the E30BE

range of compressed air filters, in pipe sizes up to 1/2 in. Improved baffling in these filters, it is claimed, ensures effective removal of corrosive condensate and oil emulsions from compressed air over the full range of air flow capacity. Large transparent bowls are provided for collecting the liquid, and the quiet zones, in which the trapped liquid is held, have been increased in size, so that less frequent emptying is required.

In the type 30BE compressed air filters, for pipe sizes of % in. and 1 in., the air is first filtered for removal of solids, the element also serving to concentrate the water and oil emulsions for removal by swirling action on passing through the louvre plate. Particular care has been taken to ensure that the separated liquids are not picked up again by the air stream at high rates of flow. A large quiet zone is provided for the manual draining of trapped liquids. There is also a type 30BG filter with provision for automatic draining. Other exhibits include the Norgren range of relief valves for pipe sizes up to 1 in.

Thos. Firth & John Brown, Ltd., Atlas Works, P.O. Box 114, Sheffield, 4. Stand No. 7, Row Q, National

This company will display a representative selection from their range of products which includes carbon and alloy steel forgings for marine turbines and transmissions, and power station plant; forged steel rings and other components for aircraft engines; and forged steel die blocks.

Hardened forged steel rolls up to 36 in. diameter, with weights up to 17½ tons, and back-up rolls up to 56 in. diameter, with weights up to 45 tons, are supplied by the company for the production of sheet and strip in ferrous and nonferrous metal, precious metals, and plastics, for example. Other activities include the production of rolled steel bar, and steel castings, with high resistance to wear, for equipment for use in the quarrying, cement, and associated industries.

Benton & Stone, Ltd., Aston Brook Street, Birmingham, 6. Stand No. 43, Inner Row, Gallery, Grand

This company's exhibits will include a new design of heavy-duty air cylinder, as shown in Fig. 16, which is made in bore sizes of 4½ and 6 in. These cylinders can be supplied with various mounting arrangements, and cushioning features can be provided, if desired. The end covers are of forged Duralumin, and the piston rods of stainless

In addition, a comprehensive range of solderless tube fittings for tubes with outside diameters from % to 1% in., and nylon tubing in outside diameters

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Fig. 16. Benton & Stone heavy-duty air cylinder which is available in bore sizes of 4½ and 6 in.

cylinders with bores of %, 1½, 2%, 3, 4½ and 6 in. diameter, a variety of mounting arrangements, and optional cushioning, are available, also air service units, and electro-pneumatic timers. Two centralized systems of

from % to 1% in.

will be shown, the to in. sizes

being available

in seven different

Standard air

colours.

lubrication will be displayed. With the Benston system the amount of oil delivered to each

point is proportional to the number of outlets from the distributor, whereas with the "One Shot" system a pre-determined quantity of oil is accurately metered to each outlet irrespective of the number of lubricating points.

Press & Shear Machinery Co., Ltd., 172-178 Victoria Road, London, W.3. Stand No. 15, Row J, Grand Hall

On this stand will be seen examples from the range of Continental-built machines for sheet metal working, for which the company is the selling agent in this country.

The exhibits will include, the Swiss-made Bruderer type STA. 20/18 high-speed press illustrated in Fig. 17, which has a rated capacity of 18 tons. It can be supplied with alternative drive arrangements which enable different working speeds, or a steplessly-variable range up to a maximum of 1,500 strokes per min., to be obtained for the ram.

The ram slide runs on three cylindrical guide bars of steel, heat treated and lapped, two of which are mounted at the front of the bed, and the third, centrally at the rear. With this arrangement, it is claimed, tool alignment is accurately maintained, and working life is improved. The slide is fitted with phosphor-bronze guide bushes, and the crankshaft journals and the eccentric portion run in antifriction bearings, which are lubricated by a centralized system. A vertical adjustment of 2 in is available for the ram, and the press can be supplied with a fixed or an adjustable working stroke, up to a maximum of 1.3 in.

A roll feed unit can be provided, as shown, which is operated from the crankshaft, and will handle metal strip up to 5½ in. wide by ½ in. thick. This unit is normally available in three sizes which give maximum feed movements of 1½, 2½, and 5½ in. Units can, however, be supplied for feeding strip through maximum distances up to 9% in., also for handling wire and profile sections.

German-built EBU crank presses are available in capacities from 15 to 125 tons, and will be represented at the exhibition by the type 50 SKU, which was described in MACHINERY, 95/1124—25/11/59, and by a 75-ton machine. The former incorporates a speed changing arrangement in the countershaft drive to the crankshaft, which enables different ram speeds to be readily obtained, to suit drawing or blanking operations. This feature is available on all presses in the range with capacities down to 35 tons. Both presses to be shown have vertically-adjustable tables, which measure 25½ by 20¼ in. on the smaller size, and 31½ by 24 in. on the larger.

Attention may be drawn to four examples from the Elmeg (German) range of electro-magnetic presses, which can be operated continuously at high speeds, or on a single-stroke cycle. With the exception of the smallest size in the range, these presses are intended for operation on a d.c. supply, and steplessly-variable blow energies are obtained under the control of a rheostat. In addition, there will be two sizes from the German-built range of

Peddinghaus universal "steel-worker" machines for piercing, cropping, shearing and notching, and Pioneer (Swiss) nibbling and shearing machines for sheet metal.

Elgar Machine Tool Co., Ltd.an associate company-will showing on the same stand two Polak (Czechoslovak) cold chamber casting machines. The first of these machines, type CLP 85.15, has a vertically-mounted injection chamber. which can be sup-



Fig. 17. Bruderer 18-ton high-speed press

plied in different diameters from 1% to 2% in. With the largest injection chamber, components in zinc alloys, for instance, with weights up to 5-lb. can be produced. The other machine, designated type CLO 85.8, is designed for operation on a semi-automatic cycle, and has a horizontally-mounted injection chamber. It has a capacity for producing parts with weights up to 1.98 lb. in aluminium, 5% lb. in zinc alloys, and 5 lb. in copper alloys.

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Acheson Colloids, Ltd., P.O. Box No. 12, Prince Rock, Plymouth, Devon. Stand No. 34, Outer Row, Gallery, Grand Hall

On this stand there will be six panels indicative of the various fields of application for Acheson dispersions. The six classifications cover dry film, fluid film, and high-temperature lubrication, extreme pressure and parting lubricant, and conducting coatings. Exhibits concerned with the various applications will be as follows: hightemperature lubrication, a treated conveyor chain; conductivity, a heating element; parting, die castings, a glass bottle mould, and a molybdenumdisulphide treated file; fluid film lubrication, a model of a railway axle box lubricator; dry film lubrication, a nuclear energy remote control mechanism, a PTFE-coated aircraft servo piston, a radio sonde transmitter and treated components, also a stick lubricating system; and extreme pressure, a blade forging die and blades.

George Cohen Sons & Co., Ltd., Wood Lane, London, W.12. Stand No. I, Row G, Grand Hall

Down-stroking and up-stroking hydraulic presses, transportable shears, bending rolls, and gang slitting machines from the range of equipment handled by the Sheet Metal Working Department, which forms part of the Machine Tools Division of the company, will be shown on this stand.

Built by Douglas Barnes, Ltd., Heckmondwike, a member company of the George Cohen 600 Group, the 100-ton hydraulic down-stroking press to be displayed (see Machinery, 97/18-6/7/60), will take work up to 36 in. wide between the side members of the frame, and the 48- by 26-in. bed carries a 4-in. thick T-slotted bolster. speed of 35 in. per min, is provided for the downward travel, and 50 in. per min. for the return movement, and the working pressure in each direction can be varied independently. The ram travel can be varied from 11/2 to 12 in., and, if required, an arrangement can be provided for automatically controlling the working stroke at each cycle when the press is set for continuous operation. Oil is delivered at a maximum pressure of 3,000 lb. per sq. in. by a mono-radial type hydraulic pump, which is driven by a 71/4-h.p. motor.

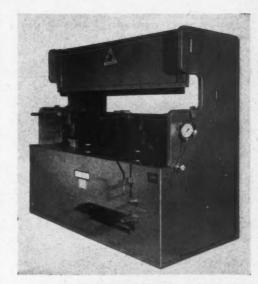


Fig. 18. Barnes 140-ton up-stroking hydraulic bending press

In Fig. 18 is shown the Barnes 140-ton hydraulic up-stroking bending press which will be exhibited. It has a capacity for bending steel plates up to 96 in. wide by % in. thick, and the hydraulic rams for the lower beam have a maximum working stroke of 12 in. The press can be operated by hand under the control of a lever, or continuously on an automatic cycle, and provision is made for pre-setting the working stroke. Weighing approximately 10 tons, the press occupies a space of 106 by 60 in., and is normally installed in a 14-in. deep pit in the shop floor. The hydraulic pump is driven by a 7%-h.p. motor.

The Eldair Cub alligator shears which will be on view, are the smallest in the range handled by the company, and have a capacity for cutting steel bars up to 6 by ¼ in. cross section and ¾ in. diameter, also angle sections up to 1 by 1 by ¼ in. The 8-in. long shearing blades have four cutting edges, which can be brought into use in turn, and the maximum distance obtainable between them is 2 in. Drive may be taken from a 1½-h.p. electric motor or a petrol engine, and the operating speed is 40 strokes per min.

Steel plates up to 72 in. wide by ½ in. thick can be handled on the Steec LTP 5/DE pyramid-type bending rolls. Of 8½ in. diameter, the top roll is adjusted by a push-button controlled 3-h.p. motor, and it can be tilted for rolling conical workpieces. The housing for the bearing at one end of the top

roll can be swung downwards to permit complete cylinders to be unloaded at the end of the rolling operation. Of 7½ in diameter, the lower rolls are not adjustable. Drive is taken from a 7½-h.p. motor, and limit switches are fitted for controlling the movement of the work in either direction during the rolling operation.

The Weybridge MS/48 rotary gang slitting machine to be displayed has 6%-in. diameter cutters, and enables a maximum of six cuts to be taken on mild steel sheets up to 48 in. wide by 10 s.w.g. Cutting can be carried out at a speed of 180 ft. per min. on sheets with thicknesses up to 14 s.w.g.

Sciaky Electric Welding Machines, Ltd., Falmouth Road (Trading Estate), Slough, Bucks. Stand No. 5, Row X, Empire Hall

Fig. 19 gives a close-up view of a Sciaky 300-kVA., fully-automatic, multiple head, machine for spot welding the rim and spider components of wheels for motor passenger vehicles. Designated type MGT.4-5, this machine is designed for operation on the company's patented 3-phase balanced load principle, at a power factor of the order of 0-85 per cent.

The MGT.4-5 machine can be adjusted for spot welding wheels of various sizes, which can be handled at rates exceeding 400 per hour. A total of eight spot welds is produced during the operating cycle, which provide a shear strength of 21 tons, and since leak-proof joints are obtained, the

machine can be used to advantage for the production of wheels for tubeless tyres. When a rim and spider have been brought to the welding position, the heads are advanced to make four spot welds of approximately ½ in. diameter. The components are then indexed, and the heads are then again advanced to complete the welding operation. Finally, the wheel is discharged from the machine by way of a chute.

It may be mentioned that equipment incorporating two MGT.4-5 machines is available, which will handle wheels at the rate of 925 per hour. In addition to performing spot welding operations, this equipment provides for piercing and chamfering a hole in each rim to take a valve, at the same set-up.

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A type PA.300 projection welding machine to be displayed is intended for handling a particular component, and is fitted with special control and recording equipment which ensures that high-quality welds are obtained consistently.

Reference may be made to a new control unit for use with a portable spot welding gun or a pedestal-type machine. Two variable heat-level potentiometers are incorporated in this unit, and can be set independently as may be required for welding different numbers of light-gauge sheet metal parts to each other at a single operation. A foot-operated switch or a grip-switch can be provided, which enable the potentiometers to be brought into use as desired, to give different welding temperatures.

Sciaky 3-phase equipment is being used on an increasing scale for spot welding light alloy and mild steel plates of exceptional thickness for the aircraft and structural engineering industries. Some indication of recent developments in this field will be afforded by examples of spot welding of particularly thick metal plates, also parts which have been prepared for metallurgical examination. One exhibit will comprise two %-in. thick plates and a 1%-in. thick plate in mild steel which have been spot welded on one of the company's latest 3phase machines to form a composite The diameter of the spot welds is 1% in., and it is claimed that this section is the largest that has yet been spot welded.

In addition, the display will include a new 50-kVA., seam/spot welder, which is based on the company's Rapid range. This machine, which will be shown in conjunction with the latest Synchroseam dekatron



Fig. 19. Close-up view of the Sciaky type MGT.4-5 multiple head machine for spot welding rim and spider components on wheels for motor passenger vehicles

modulating control system, enables circumferential and longitudinal seam welding to be carried out, also spot welding of mild steel plates of two equal thicknesses up to $\frac{3}{16}$ in., and light alloys up to 18 s.w.g.

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The British Oxygen Co., Ltd., Bridgewater House, St. James's, London, S.W.I. Stand No. 6, Row G, Grand Hall, No. I and 5, Row W, Empire Hall.

A variety of new equipment will be shown on these three stands, and attention will be drawn to the comprehensive distribution system operated by the company for the supply of oxygen, propane, nitrogen, argon, and acetylene. The latest vacuum-insulated, type VIE 30, evaporator vessel, which is one of a range with air-heated vaporizers, will be on view.

Hand equipment will include the new Firefly lightweight cutting blowpipe, and the Saffire welding blowpipe. The latest Bison profile cutting machine incorporates a new automatic line-following device which eliminates the need for templates. A new lightweight portable straight line and circle cutting machine will also be on view, together with the Alyn pipe cutting machines for pipeline work and branch preparation. In addition, there will be a comprehensive range of Sievert air/propane heating equipment, and films covering a wide range of flame processes will be shown.

For electric welding there will be the new type MRCS.300 slope-controlled rectifier, designed for semi-automatic operation with the "short circuiting arc" technique. It may be used with Lynx equipment for welding mild steel and stainless steels, and will be demonstrated with the type ST2 torch. It will also supply power for the Unionarc electric welding process which is carried out with bare wire, carbon dioxide gas, and a magnetic powdered flux shield. Attention may also be drawn to a Mk.2 twin-fillet welder equipped with two "basic" heads. The latter are adaptable for the Fusarc/CO₂, Fusemelt, Unionmelt, or Sigma automatic processes.

A new lightweight 225-amp, generator will be shown in both diesel and electrically-driven forms. Other exhibits will include a ram-type welding boom and roller bed installation, the portable Sigmette gun and control for non-ferrous welding, and a range of Quasi-Arc electrodes for manual, semi-automatic, and automatic electric welding processes

Among the exhibits of argonarc welding equipment, may be mentioned the new type SW.300 spot welding torch which is designed for use by semi-skilled operators. Spot welds can be made with one hand, and access to only one side of the joint is required.

Carter Gears, Ltd., Thornbury Road, Bradford 3, Yorks. Stand No. 9, Row AA, First Floor, Empire Hall

An addition to the range of Carter hydraulic variable speed gears, known as the AM26, of 10-h.p. rating, will be demonstrated for the first time.



Fig. 20. Carter AM26 hydraulic variable speed gear of 10-h.p. rating

This unit, which is illustrated in Fig. 20, is similar in design to the type A unit, and it incorporates the same patented torque-sharing, positive displacement, hydro-mechanical principle.

Another exhibit will be an F10 Carter gear, which has been modified in external design to facilitate the fitting of driving motors, control gear, or other auxiliary equipment.

The company's variable speed gears are made in 11 sizes from fractional to 40-h.p. rating, and complete drive systems, including reduction gears and motors, will be demonstrated, together with various control arrangements.

A. Schrader's Son, Division of Scovill Manufacturing Co., 829 Tyburn Road, Erdington, Birmingham 24. Stand No. 15, Inner Row, Gallery, National Hall

This company's exhibit will include a series of demonstration circuits incorporating Schrader products for the control and application of compressed air. There will also be an air-operated fixture for a light drilling operation, and representative examples of air cylinders, including the new squareend type. Other Schrader products which will be displayed include air presses, air ejection sets, control valves, the Lub-air-ator lubricator, quick-acting couplers, and blow guns.

Desoutter Bros., Ltd., The Hyde, Hendon, London, N.W.9. Stand No. 12, Row J, Ground Floor, Grand Hall

A complete range of the well-known Desoutter pneumatic and electric power tools and multiple units for semi-automatic assembly will be displayed on this stand, together with examples from the range of 2,000 different standardized die sets that

Carter Stevens (Automation), Ltd., now a member company of the Desoutter Group, will take part in an exhibition for the first time. Pneumatic cylinders, valves, and other items of control gear will be shown by Lang Pneumatic, Ltd., another member of the Group.

Baldwin Instrument Co., Ltd., Princes Road, Dartford, Kent. Stand No. 26, Inner Row, Gallery, Grand

Exhibits on this stand will include the self-contained drilling unit seen in Fig. 21, which has an air-driven spindle and air-operated feed motion. The valve assembly enables the unit to be set to perform an automatic cycle comprising rapid approach, feed, and rapid return, and a number of units can be combined for multiple spindle operation, in conjunction with an indexing work-table. The rate of feed is steplessly variable.

Baldwin power cylinders are made in some 380 standard types with bore sizes from ½ to 8 in., and are suitable for both air and low-pressure

hydraulic tion. flange provided. piston hard plated malleable iron end covers incorporate sintered bronze piston rod bushes.

Directional con-



trol valves can be supplied in 14-, 1/4-, %-, and 1-in. bore sizes, with a

variety of mechanical, pilot, and electric operating Push-button and solenoid-operated pilot valves of %-in. bore size are also available, together with speed and flow regulators, stop and check valves, pressure regulators, a filter lubricator, and the Lubro-Control unit which provides for filtration, water separation, pressure regulation, and injection of oil mist. In addition to standard units, air control equipment for special applications will be shown.

Guest Keen & Nettlefolds (Midlands), Ltd., P.O. Box No. 24, Heath Street, Birmingham 18. Stand No. 14, Inner Row, Gallery, National Hall

The Screw Division of this company will show the wide range of Wedglock screws and nuts already described in MACHINERY, together with examples of high-quality bolts and push rods, and various types of corrosion-resistant fasteners.

Exhibits of the Bolt and Nut Division will include black, bright, and high-tensile bolts, and there will be a special display of G. K. N. highstrength and G. K. N. Torshear friction grip bolts. An addition to the range is a load indicating bolt which provides visual indication that a specified minimum tension has been reached during tightening. There will also be examples of G. K. N. weld nuts, which can be welded to sheets to provide permanent tapped holes in positions which are not readily accessible.

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Crompton Parkinson (Stud Welding), 1-3 Brixton Road, London, S.W.9. Stand No. 2, Row X, Empire

Recently-introduced argon-shrouded stud welding equipment, which will be demonstrated on this company's stand, enables aluminium studs up to in. diameter to be welded to light alloy parts. During the welding operation, the stud and the surrounding ferrule are shrouded by a supply of argon gas which is delivered to the working area by way of a valve built into an attachment carried on the stud welding gun. In this way, it is stated, atmospheric contamination, and consequently porosity of the weld, is avoided. In Fig. 22 is shown a type D stud welding gun fitted with the new attachment for the argon gas supply. design of the valve is such that it is opened only when the attachment has been brought into contact with the work for the welding operation, to avoid waste of argon gas.

Investigations carried out by the company on aluminium studs which have been welded without argon gas shrouding, have shown that impurities in the weld result partly from atmospheric contamination and partly from a film of drawing lubricant on the studs. To ensure removal of



Fig. 21. Baldwin self-contained air-operated drilling



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Fig. 22. Crompton Parkinson type D stud welding gun fitted with an attachment for an argon gas supply to prevent work oxidation

drawing lubricant, a light turning cut is usually taken on studs prior to welding.

Other investigations have shown that when a ½-in. diameter aluminium stud is being welded, fusion is not obtained over the entire cross sectional area on account of the reduced temperature at the periphery. Following these investigations, the company has developed equipment for pre-heating studs in preparation for welding. With this equipment, a current of about 70 amp. is applied to a ½-in. diameter stud, which can thus be brought to the required welding temperature in approximately 3 sec.

A type J/K stud welding gun and the associated control unit, which will be shown, are noteworthy for compactness and lightness, and are claimed to offer particular advantages where operations must be carried out in confined spaces. Attention may also be drawn to the recently-introduced "shear connectors," which are intended for use in the structural engineering industry, and take the form of studs with cold-forged heads. The end of such a connector is secured to a steel beam by stud welding, and the head portion then serves as a key when concrete is cast in position.

Another new product to be exhibited is the type TRS 8 transformer-rectifier, which is intended principally for use in the structural engineering industry. It gives a maximum current output of 4,700 amp. for welding of studs and shear connectors up to % in. diameter.

The Consolidated Pneumatic Tool Co., Ltd., 232 Dawes Road, London, S.W.6. Stand No. 6, Row C, Grand Hall

Working demonstrations of various tools from the company's pneumatic and high-frequency electric ranges will be given on this stand, including pneumatic and Hicycle impact wrenches, and the recently-introduced type 3008 Magnamatic screwdriver. The type C.P.327 drilling unit, with airoperated feed motion, will also be shown in operation, together with the light-duty type 3008, 3017 and 3075 pneumatic drills, and Hicycle drilling and tapping tools, including a type 495 drilling unit mounted on a sliding, radial arm. Another new tool, the C.P.3017F saw and file (MACHINERY, 98/358—15/2/61), will be demonstrated in conjunction with a pneumatic vice.

A number of grinders from the company's range will be on view, also the recently-introduced zip gun, and Hicycle and pneumatic shears for sheet metal working. Among other products to be exhibited, reference may be made to a range of worm gear jacks, and a selection of riveting hammers, rammers, scaling hammers, holders-on, and Lagonda tube cleaning equipment.

Charles Weston & Co., Ltd., Douglas Green, Pendleton, Salford, Lancs. Stand No. 6, Outer Row, Gallery, Grand Hall

Exhibits on this stand will include the Weston standard range of oil seals, which comprises single, double, tandem and external types, with leather or synthetic rubber wiping lips. For heavy-duty service, for example, in rolling mills, oil engines, gearboxes, and marine stern tubes and steering gear, there are Weston split seals in which all wearable parts are renewable. The firm's Impax mechanical seals are available for applications where high performance characteristics are required, and the range also includes Dupax seals for water pumps. In addition, Weston synthetic rubber mouldings to customers' designs will be displayed by this company.

Martonair, Ltd., Parkshot, Richmond, Surrey. Stand No. 24, Outer Row, Gallery, National Hall

This firm's exhibits will include a recently-introduced "tray lift" unit illustrated in Fig. 23, which enables tote boxes and pallets, for example, to be set at a convenient height for loading and unloading workpieces.

A box or pallet is carried by a pair of anglesection forks which can be adjusted in a vertical direction by built-in single-acting air cylinders, controlled by push-buttons mounted on top of the unit. The distance between the forks is normally 12½ in., and a wood or metal platform can be fitted, if desired, also forks of different shapes, to suit requirements. It is intended for operation from a shop compressed air supply, and a bayonet-type coupling piece is provided for connecting a hose.

The unit will be demonstrated in conjunction with a fully-automatic 6-spindle machine which has been built by the company for drilling, reaming, and spotfacing end covers for Martonair Minor air cylinders. End covers, on which these operations are to be performed, are stacked in a hopper at the left-hand end of the machine, and at each working cycle, the lowest component in the stack is advanced into the fixture, in a horizontal direction, by an air-operated pusher slide, and is thus brought to the first machining station. At the same time, partly-machined components are moved from one station to the next, and a completed end cover is discharged from the machine by way of an inclined chute at the right-hand end. There are three machining stations, and at each operating cycle, the belt-driven cutter spindles, mounted horizontally in groups, at both sides of the fixture, are advanced simultaneously by hydraulic cylinders, to which pressure oil is delivered by an air-hydraulic intensifier. Components at the working stations are clamped by three vertically-mounted air cylinders. The machine will handle end covers at the rate of 450 per hour.

One section of the display will be arranged

to indicate some of the advantages that can be obtained when compressed air equipment is operated in conjunction with low - pressure hydraulic cylinders. It will include a special display panel with a circuit for an airhydraulic system for supporting a stack of workpieces, which is so designed that the top of the stack is maintained at a constant height when components are added or removed.

Recent additions to the company's' range of comfilters and lubricators for air lines, also type S.700, %-in. B.S.P., valves which are available with a wide variety of operating arrangements. Impact cylinders to be shown may be used for a variety of duties, including punching, riveting, coining, sizing, and marking. They are available in a range of sizes which have ratings for blow energy, from 0·1 up to 2 ton-in. An impact cylinder with a rating of 1 ton-in. for instance, will deliver a maximum blow of 20 tons, and when it is operated by compressed air at 80 lb. per sq. in. pressure, it enables a 1-in. diameter hole to be pierced in a %-in. thick mild steel plate. This cylinder can be operated at speeds up to 30 strokes per min.

The display will include position controllers,

pressed air equipment will be shown, including

The display will include position controllers, which can be supplied integral with Martonair air cylinders with bores down to 2 in., or as separate items, for operating diaphragm-type valves for example. In addition, the units may be employed in conjunction with Martonair torque units. These units are usually used on double-acting air cylinders for controlling the movements of the pistons irrespective of the working loads. Among other exhibits may be mentioned silencers for compressed air equipment, and recently-introduced air cylinders with % and 1%-in. diameter bores, which can be supplied with a wide range of working strokes.

Maxam Power, Ltd., 44 Brook Street, London, W.I. Stand No. 4, Gallery, Grand Hall

This Holman Group company will exhibit a comprehensive range of fluid-power control equipment, which includes a number of new products. Among the latter may be noted an example from a redesigned range of Maxam cylinders which will shortly be available in bore sizes of 8, 10 and 12 in. Centre hinge, rear trunnion and pedestal mountings, which are additional to the previous range, will be available for the basic cylinders.

A new 4-way, %-in., solenoid-operated pilot valve is suitable for controlling small, double-acting cylinders, or for the pilot operation of larger valves. Rapid unloader valves, available in ¼- and ¼-in. sizes for mounting adjacent to cylinders to increase working speeds, will also be shown, together with new attachments for the existing range of Maxam ¼-in. panel-mounting valves for rotary operation. These valves are particularly intended for use on electro-pneumatic control panels. Attention may also be drawn to centre trunnion mounting attachments which are now available for all Maxam cylinders from 1½ to 6 in. bore.

Maxam equipment will be seen in operation on two Baker Perkins Type 50 Autoblow units for blowing plastics bottles.



Fig. 23. Martonair airoperated adjustable "tray lift" unit

Metco, Ltd., Chobham, Woking, Surrey. Stand No. 10, Row A, Grand Hall

For the first time at an exhibition in this country, demonstrations will be given with the Metco plasma flame spray gun which enables many types of metals, refractories and oxides to be deposited as coatings, which it was not previously possible to apply. Materials that can be sprayed include chromium, cobalt, molybdenum, tungsten, chromium carbide, rare-earth oxides, titanium oxide, calcium zirconate, and many others that do not decompose when melted. materials, it is stated, when applied with the type MB plasma equipment, give dense coatings with a high degree of bonding to the base metal. The equipment has been designed for use in connection with development work in the jet and rocket motor fields, on guided missiles, and in the nuclear and electronic industries, where these high temperature materials find application.

The company will also demonstrate the more conventional Metallizing and ThermoSpray hard facing processes using both wire and powder, and there will be examples of applications to such items as rolls, crankshafts, journals, gauges, cylinder

bores, and shaft components.

Southern Instruments, Ltd., Frimley Road, Camberley, Surrey. Stand No. 16, Inner Row, Gallery, Grand Hall

The types M1148 and M1149 portable tachometers will be exhibited by this company, the M1149 instrument being shown in Fig. Rotational speeds in three ranges are indicated on a 6% in. diameter scale. For the M1149 tachometer these ranges are from 0 to 3,000, 0 to 10,000, and 0 to 30,000 r.p.m. The M1148, which is of similar construction, has ranges of 0 to 30,000, 0 to 100,000, and 0 to 300,000 r.p.m. tachometers are transistorized and are operated by a photo-probe or magnetic pick-up. Both can be supplied with current from the mains, or from an external 12-volt battery. Pick-up voltages produced by either type of probe are converted into pulses of constant area. The average current through the meter is proportional to the number of these pulses, and thus provides a measure of shaft speed.

A type M1154 transistorized digital frequency and time interval meter, which will be shown, enables unknown frequencies between 0·1 c/s and 120 Kc/s to be measured, using count periods of 0·1, 1, or 10 sec. The counting interval may also be controlled manually. Time intervals, defined by electrical signals or contact closures, can be measured in crystal-controlled clock units of 0·1

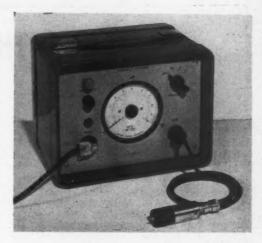


Fig. 24. Southern Instruments type M1149 portable tachometer

milli-sec. to 10 sec., in decade steps, to a maximum of 10,000 units.

In addition, attention may be drawn to the MUR 6 multi-channel oscillograph recorder, and to the ME122 engine indicator. The latter equipment displays two variables simultaneously, and has been specially designed for use in the investigation of internal combustion engines and compressors. The 6-in. cathode ray tube is hingemounted to give a convenient visual display, with provision for immediate change to the recording position. Any transducer and pre-amplifier system from the company's range may be incorporated in this recorder. The E7A F.M. pre-amplifier equipment is also being shown.

The M 977 double-gun, direct-coupled, low-frequency type oscilloscope, which will be among the exhibits, can readily be converted into a comprehensive, 2-channel recording oscillograph, by means of a wide range of transducers, pre-amplifiers, and recording cameras, together with

a time marker.

Petrol-cooled Motor.—For the new 1,400 series Meteor petrol pumps which have been introduced by the Wayne Tank & Pump Co., drive is provided by Crompton Parkinson electric motors of % or % h.p. Both motors have identical fixing dimensions, and either is flanged into a housing which is immersed in petrol in the main body of the pumping unit. The petrol is pumped from the underground tank at low temperature and flows around the outer casing to cool the motor.

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NEWS OF THE INDUSTRY

The Midlands

Hr-Ton Machine Tools, Ltd., Sheepcote Street, Birmingham, have a good order book for special purpose machine tools, including equipment for automatic assembly operations. One interesting machine of the latter type, now nearing completion, has eight stations on a rotary indexing base and is to be employed for the assembly of small disc valves. Parts will be delivered to work stations from two Podmore bowl feeders, and when assembled will be ejected from the final station, at 4-sec. intervals, by a swinging arm fitted with a suction head connected to a

. . .

The illustration shows an automatic bright nickel and chromium plating plant at the works of S. Smith & Sons (England), Ltd. This plant is provided with reinforced plastics fume extraction ducting and trunking which was moulded by W. Canning & Co., Ltd., from polyester resin and Deeglas chopped strand glass fibre mat, supplied by Glass Yarns & Deeside Fabrics, Ltd., 9 Kingsway, London, W.C.2

vacuum pump. Three machines have been supplied over a period for the assembly of glass insulators of the type employed in connection with transmission of electricity at very high voltages.

Hi-Ton straightening presses are in regular demand and there is a sustained interest in Vertibroach broaching machines. This company also builds hydraulically-operated cold forging presses. One of these presses, installed in the works, is rated at 350 tons on the down-stroke and 40 tons on the up-stroke. It has been employed for cold forming gear blanks from billets, without waste of material.

CHARLES TAYLOR (BIRMINGHAM), LTD., Bartholomew Street, Birmingham, 5, are as busy as ever with the building of cold-sawing machines, capstan lathes, spinning lathes, and other machine tools for which there is an increasing demand. A full range of machine tool vices, lathe chucks, and accessories is also in production.

SOCKETEX, LTD., 1077 Kingsbury Road, Birmingham, 24, with a view to increasing the production of cold-forged set screws and socket-headed cap

> screws in sizes from 4 B.A. to 1/2 in. diameter. with thread forms including B.S.W., B.S.F., and Unified, propose to increase the area of their works during the next two years to 40,000 sq. ft. which will be three times the present size. Additional cold heading machines and a variety other production equipment are to be provided, and the range of socket screws will be extended to include Metric sizes. It is reported that there is a rising trend in the sales of the company's products. including the range of patented Tbolts.



DELORO STELLITE, LTD., Highlands Road, Shirley, Birmingham, are still very busy in all departments concerned with the production of faced and solid components in which Stellite alloys are employed as cutting or wear resistant media. Typical components in this range include extrusion dies, bearings for high temperature applications, turbine blade shields, and steam valve inserts. Extensive use is now being made of the Spray-Fuse method developed by the company for applying Stellite powder to a wide variety of parts, which are thus provided with surfaces of increased hardness and improved resistance to corrosion, as required, for example, for arrester hooks for aircraft, pump shafts, and the recently introduced "gas" bearings. A high output of Stellite drills is being maintained. These drills, it is stated, are being increasingly employed for the removal of broken taps and drills from valuable workpieces and for producing holes in hardened steel parts.

THOR HAMMER Co., Highlands Road, Shirley Birmingham, have again extended the range of materials from which the renewable inserts of their soft-faced hammers are made, to include nylon. The full range now comprises, in addition, rawhide, copper, rubber, aluminium, and oil resistant plastics, which may be employed separately or in combination for opposed faces. Thor hammers have been marketed for 25 years, and during this period they have been supplied to users in light and heavy industries for assembly work, straightening operations, bending sheet metal, removing dents and separating press tools, for example. As the faces are of non-sparking material, the hammers can be used in petrol storage areas and other places where fire hazards exist. Approximately 20 per cent of the output of the works is exported direct and a further proportion is included in tool kits of British sports cars sent overseas. The works, which were built two years ago, are soon to be enlarged to provide for increased production.

The Gear Grinding Co., Ltd., Cranmore Boulevarde, Shirley, Birmingham, report a sustained demand for their standard range of gear grinding machines, also specially adapted machines, for example, for grinding transmission gears for motor vehicles. Export orders are well maintained and in this connection we may note that another internal spur-tooth grinding machine is being built for delivery to Russia, and a 20-in. spline grinding machine for a firm in Sweden. A Mk. 3 involute gear testing machine and a 36-in. spline grinding machine are being shown by the company at the 4th Tokyo International Trade Fair.

George Walker & Sons (Birmingham), Ltd., Warwick Road, Tyseley, Birmingham, whose connection with files and cutting tools dates from 1847, when the founder established a factory in Bath Street, Birmingham, are receiving a satisfactory volume of orders for milling cutters of many types, which are produced in the works. Large stocks of high-speed steel cutters are carried in the extensive stores, for immediate delivery, and facilities are available for the manufacture of special cutters, usually at short notice. Covering an area of some 26,000 sq. ft., the premises, built in 1957, occupy as its with main road frontage, and all the departments, including a modern heat treatment bay, are housed under one roof.

CLARKE, OLSEN (GEARS), LTD., 194-196 Heeley Road, Selly Oak, Birmingham, are busy with the production of small and medium sized gears with various helix angles up to 45 deg. for use in electronic equipment, food mixers, electric fans, multispindle drill heads and speedometer drives, for instance.

Recently, the output capacity of the works has been increased by the installation of additional Mikron gear hobbing machines, including a type 132, with hydraulically-operated cycle. Dowding & Doll type V8 and V4 gear hobbing machines and a number of Myford centre lathes are also in use in the works. Gears up to 14 in. diameter by 5 D.P. and down to 0·2 in. diameter by 120 D.P. are produced from materials which include nylon laminated plastics, phosphor bronze, brass, and steel.

F. W. HERRIDGE.

The South

CENTEC MACHINE TOOLS, LTD., Hemel Hempstead, Herts., are working extra shifts in order to meet the increasing demand for Centec type 3 programme-controlled production milling machines, and will shortly introduce a Mk. 2 version of this machine provided with a 5-h.p. driving motor, increased height from table to centre line of arbor, and automatic variation of table feed to maintain maximum rate of stock removal during machining. A good request is also reported for Centec Automil machines which are intended mainly for pendulum milling operations, whereby idle time for loading workpieces is avoided. A hydro-pneumatic system of table traversing is employed and steplessly-variable feed rates from 1 to 400 in. per min. can be obtained in both directions. The range of Centec automatic, pneumatically-operated, indexing tables includes 8-in. and 16-in. sizes, which are frequently incorporated in rotary transfer machines and special purpose equipment of simpler construction.

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ROTO-FINISH, LTD., Hemel Hempstead, Herts., are enlarging their works in order to provide additional capacity for the production of barrel-finishing machines and other equipment intended for cleaning and polishing a wide variety of metal and plastics parts. Interest is being shown in many quarters in the new range of Osromatic vibratoryfinishing machines in which the amplitude of vibration employed for the mechanical finishing process may be either constant or variable. A sustained demand is reported for degreasing, cleaning and phosphating plant; also for electropolishing plantnotably the M.E.P.P. range of equipment. In the latter connection it may be mentioned that an installation of this type, with a capacity of 1,000 gal., has been installed by the company in a works at Wolverhampton for the electropolishing of brass gas lighter and battery torch parts, in preparation for further processing in nickel and chromium plating baths.

Access Equipment, Ltd., Hemel Hempstead, Herts., report a growing interest in their range of Clinch tube joints, as described in Machinery, 98/165—18/1/61, which was introduced as a means of simplifying the fabrication of tubular structures, including, for example, storage racks, trestles, drum stands, and guard rails. Clinch joints are of split construction and are made in several forms, of which the commonest are single-cross and single-tee, for use with resistance welded tube. Joints and associated lengths of tubing are

Bicep hydraulically-operated lifting platforms for inclusion in assembly lines in a motor car factory

assembled permanently by manual hammering and the work involved is sufficiently simple to be performed by unskilled labour.

There is a good demand for Mountie safety steps and Bicep hydraulically-operated lifting platforms. The latter, which can be supplied for stationary or mobile applications, are built in several sizes with lifting capacities up to 10 tons. Occasionally, larger lifting platforms are constructed for special purposes, an example being shown in the accompanying illustration. The two platforms, one seen raised and the other lowered, are to be installed in assembly lines in a motor car factory. Each platform is required to operate once per minute for periods of three hours, and to reach a fully extended height of 10 ft., from a closed height of 3 ft., in a time of 15 sec. Each platform measures 14 ft. 6 in. by 5 ft.

F. W. HERRIDGE.

Avey Turret-Dex Turret Drilling Machine

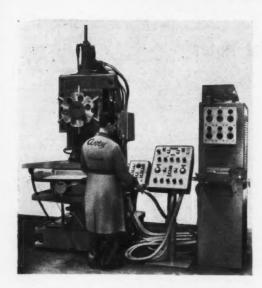
The Avey Division, Motch & Merryweather Machinery Co., Cincinnati, Ohio, U.S.A., have added to their range the No. 250 Turret-Dex hydraulic turret drilling machine shown in the accompanying illustration, which has capacity for drilling up to 1½ in. diameter in mild steel.

Individual spindles are mounted in taper roller bearings in the 6-position turret, which is indexed and clamped automatically, and the range of speeds obtainable may be in either 6 or 12 steps.

> The maximum working travel is 8 in., and steplessly-variable feeds from 0 to 120 in. per min. are available, also rapid power traverse at 240 in. per min. Adjustable micrometertype depth stops are provided. Controls on a panel at one side of the machine are used for pre-selecting the spindle speeds, down feeds, and rapid traverse, and enable the spindle to be automatically reversed when tapping is being carried out. The maximum distance obtainable between the spindle noses and the surface of the work-table, which normally measures 35 by 20 in., is 35 in.

If required, a numerically-controlled co-ordinate positioning work-table can be fitted, and dimensional data are supplied to the equipment associated with this unit by means of punched tape. Holes in the tape may be pierced by hand or with the aid of a special typewriter.

Avey machines are marketed in



Avey No. 250 Turret-Dex 6-spindle turret drilling machine

this country by Rockwell Machine Tool Co., Ltd., Welsh Harp, Edgware Road, London, N.W.2.

Czechoslovak Trade Delegation

A delegation from the Czechoslovak Chamber of Commerce recently visited Britain for discussions with the Anglo-Czechoslovak Section of the London Chamber of Commerce, 69 Cannon Street, E.C.4.

At a recent meeting, it was pointed out that although trade in both directions between the countries had increased steadily during the past three years, a further large growth was possible. Between 1961 and 1965, industrial investment in Czechoslovakia would require to be nearly 88 per cent higher than in the previous 5-year period, if the third 5-year plan was to be fulfilled, and particular importance was being attached to the chemical and metallurgical industries.

A trade mission from the London Chamber of Commerce would visit Czechoslovakia in the autumn, and at the Brno Trade Fair in September, facilities would be provided for members of the Chamber to negotiate with Czech industrialists. In this country, the Czechoslovak delegation had started negotiations with Industrial & Trade Fairs, Ltd., Drury House, Russell Street, London, W.C.2, with a view to staging a major trade fair in London in the spring of 1962 or 1963.

Following questions at the meeting, disappointment was expressed by the Czechoslovak mission at the apparent lack of enthusiasm of some British firms as regards exporting to their country. Trade with West Germany, it was pointed out, was increasing more rapidly than was trade with Britain. West German prices were extremely competitive, and German firms were willing to compromise over trade difficulties.

The Economic Survey

(Continued from page 867)

"competitiveness in prices," that deliveries of machinery and equipment to home factories are maintained at a much higher level than in the past. Evidently, these dual requirements can only be met by rapid expansion of the production capacity of the machine building industries as a whole. Before putting further extensions in hand, however, many companies may reasonably ask for some more concrete assurances that Government policy in relation to the encouragement of investment by manufacturing industry will be more consistent in the future than in the past.

New Companies Registered*

Molesey Machine Tool Co., Ltd., 44 London Road, Kingston upon Thames, Surrey. Registered March 16, 1961. Nom. cap.: £2,000 in £1 shares. Directors: R, K. Levine, D. A. Levine, and E. H. Spendlove.

SOUTH-EAST ENGINEERING (ROMFORD), LTD., 95 Victoria Road, Romford, Essex. Registered March 21, 1961. To carry on the business of tool, pattern and machinery designers, general engineers, etc. Nom. cap.: £25,000 in £1 shares. Directors: K. R. Beetlestone and L. A. Butler.

JAMES WHITE (PRECISION ENGINEERS), LTD., 175a High Street, Uxbridge, Middlesex. Registered March 24, 1961. Nom. cap.: £5,000 in £1 shares. Directors: E. White and Mrs. A. A. White.

Power Tools (Patents), Ltd. Registered March 20, 1961. To carry on the business of machine tool manufacturers and dealers, etc. Nom. cap.: £5,000 in £1 shares. Permanent directors: W. Lidster and M. P. Lidster, 11 East Avenue, Scalby, Scarborough.

RUBERY, OWEN (SCOTLAND), LTD., Booth Street, Darlaston, Staffs. Registered March 22, 1961. To carry on the business of constructional engineers, etc. Nom. cap.: £100,000 in £1 shares. Directors: A. G. B. Owen, C.B.E., E. W. B. Owen and M. Beevor.

Presswork & Fabricators, Ltd., 3 Frederick Road, Edgbaston, Birmingham, 15. Registered March 24, 1961. Manufacturers of and dealers in ferrous and non-ferrous castings, mouldings, etc. Nom. cap.: £5,000 Directors: J. H. H. Bradburn and W. G. Richardson.

*From the lists compiled by Jordan & Sons, Ltd., Company Registration Agents, 116-118 Chancery Lane, London, W.C. v.

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Industrial Notes

GLASS FIBRE FABRICATIONS, LTD.—The address of this company is now Hadfield Mills, Hadfield, Manchester.

THE FEDERATION OF BRITISH RUBBER AND ALLIED MANUFACTURERS has moved to 19-20 Berners Street, London, W.1. The telephone numbers, Museum 2671 and 0268, have not been changed.

THE BRITISH WAGON Co., LTD., 13 Grosvenor Crescent, London, S.W.1, have recently opened an additional branch at Prudential Buildings, 59 St. Andrew's Street, Cambridge.

LECTURES ON INDUSTRIAL AND FACTORY LAW will be given by Mr. Harry Samuels, O.B.E., M.A., under the auspices of the Industrial Welfare Society, at their head-quarters, 48 Bryanston Square, London, W.1, on May 9 to 11.

B.P.S. Machinery & Spares Co., Ltd., 245 Knights-bridge, London, S.W.7, have been appointed sole agents for Great Britain for the Staehely range of gear hobbing machines, which includes machines with capacities up to 33½ in. diameter and 2 d.p. Fully automatic magazine-loaded machines are also built.

Course in Control Engineering.—Nottingham and District Technical College, Burton Street, Nottingham, will hold a post-graduate course in Control Engineering from May 29 to June 2. The fee is £3 3s., and further particulars and application forms can be obtained from the above address.

The Number of People Employed in Manufacturing Industries decreased by 8,000 in February, to a total of 8,903,000. There was a rise of 4,000 in "engineering and electrical goods," and for "metal manufacture" the total was unchanged. In "shipbuilding and marine engineering" the number fell by 1,000, in "vehicles" by 3,000, and in "metal goods" by 1,000.

ELGAR MACHINE TOOL Co., LTD., 172-178 Victoria Road, London, W.3, have recently been appointed sole distributors in this country for the type 2000 horizontal boring machine made by Fabbrica Macchine Industriali, Naples, Italy. This machine has a 24- by 18-in. work-table, and the diameter of the cutter spindle is 80 mm. (3·150 in.). Spindle speeds range from 35 to 1,750 r.p.m.

Fescol, Ltd., North Road, London, N.7, and Prospect Works, Chase Road, Brownhills, Walsall, ask us to state that following the death of Mr. A. E. A. McGrath and pending the appointment of a successor to cover the Midlands and South Wales, their other technical representatives are at the disposal of customers in these areas, who are requested to communicate with either of the above addresses.

JAMES BOOTH ALUMINIUM, LTD., Argyle Street, Birmingham, have ordered a large plate stretching machine, at a cost of about £150,000, including installation, from

Fielding & Platt, Ltd., Atlas Works, Gloucester. Intended for flattening material for use in the shipbuilding, transport, and general engineering industries, the machine will have a capacity for plates up to 12 ft. wide, 1 in. thick and 50 ft. long.

W. E. SYKES, LTD., Manor Works, Staines, Middlesex inform us that their agents in Japan, Kaigai Tsusho K.K. Tokyo, are showing two Sykes gear cutting machines at the 4th Tokyo International Trade Fair. One of these machines, a type 1A semi-automatic horizontal generator, is destined for Hino Motors, Ltd., and the other, a Sykomatic, turret loading, high production generator, for Bridgestone Jitensha, Tokyo.

E.S.C. Tools Pry., Ltd.—The new cutting tool factory of this company in Princes Highway, Dandenong, Victoria, Australia, was recently officially opened by the Premier of Victoria, The Hon. H. E. Bolte, M.L.A. Built at a cost of £300,000, the factory will manufacture high-speed steel twist drills and taps to the same designs and quality standards as those produced by English Steel Tool Corporation, Ltd., at Openshaw, Manchester.

B.I.M. OVERSEAS CONFERENCE.—" Industrial Growth in Developing Countries," will be the theme of a conference which is being organised by the British Institute of Management, 80 Fetter Lane, London, E.C.4, to launch a programme of activities concerned with the problems facing United Kingdom companies operating overseas, and those studying the opportunities that are arising. The conference will be held at the Metropole Hotel, Brighton, on April 26 and 27.

STEEL AND PIG IRON PRODUCTION.—Production of crude steel during March averaged 471,000 tons per week, as compared with 485,300 tons in February, and 485,100 tons in March, 1960. Fall in output occurred mainly in the North and South Wales, where works were affected by temporary weakness in demand for sheet and tinplate. Output of pig iron in March averaged 313,500 tons, as compared with 302,400 tons in February, and 312,300 tons in March, 1960.

A Course in Production Technology for qualified engineers has been arranged by the Borough Polytechnic, Borough Road, London, S.E.I. It will be held from May I to June 23 (9.30 a.m. to 4.30 p.m. each weekday) and the fee is £7. The course will cover production techniques, jigs and tools, metrology and inspection, strength of materials, machining processes, management studies, machine tools, and metallurgy and heat treatment. Further particulars and application forms can be obtained from the secretary at the above address.

UDDEHOLM, LTD., Crown Works, Northwood Street, Birmingham, 3.—The parent organization in Sweden is now publishing an international edition, in English, of the journal *Uddeholmaren*. It will be issued once a year.

Copies of the first number may be obtained from the above address. Articles are concerned, for example, with research for the Uddeholm steel mills, the combination mill at Hagfors, open cut ore working, and Uddia drill steels with carbide bits.

British Indicators, Ltd., Sutton Road, St. Albans, Herts., have been granted a licence by the British Standards Institution, to apply the Kite Mark to the range of John Bull dial indicators which are produced in accordance with B.S. 907. It is pointed out that this identification will enable users to dispense with acceptance checks. The necessary standard of performance and accuracy, it is stated, is ensured as a result of improvements in manufacturing techniques, and the development of pinion lapping.

KODAK SAFETY EXHIBITION.—From May 1 to 6, an exhibition "in the interest of safety in the factory, in the home, and on the road" will be staged by Kodak, Ltd., in Kodak Hall, Wealdstone. It will be open to all, daily from 9 a.m. to 9 p.m. (admission free). In addition to the accepted fields of accident prevention, attention will be drawn to noise suppression, problems associated with ionizing radiations, scheduled maintenance, standardization, colour and lighting, and human kinetics.

THE METAL AND PLASTIC COATINGS ASSOCIATION, 189 Brent Crescent, North Circular Road, London, N.W.10, will hold a symposium on May 9, at 2.30 p.m., in the Conference Room at Earls Court, London, in connection with the First International Industrial Finishes Convention and Exhibition. Papers will be presented on the following subjects: the characteristics of raw materials in plastics coatings; metal spraying for finishing preparatory treatments; and painting sprayed metal coatings. Further information can be obtained from the Secretary, at the above address.

GEO. SALTER & Co., LTD., West Bromwich, are making preparations for building a new 2-storey warehouse of reinforced concrete construction on the site of their North Works, which are devoted to the production of spring balances and retaining rings. Facilities for palletized storing and mechanical handling of products in the company's range will be provided on the first floor of the new building, and the making of packing cases, also packing and despatch, will be undertaken on the ground floor. It is estimated that the new warehouse will cost £100,000, and it is expected that it will be completed early next year.

I.C.I. Technical Papers. Following a number of successful meetings last year in provincial centres, at which technical papers were presented by members of the staff of Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.I, arrangements have been made to extend the scheme this year. Meetings for the benefit of works engineers will be held on various dates in April and May in Derby, Liverpool, Manchester, Leeds, and Glasgow, and subjects of papers will include: use of Thermex heat transfer medium; application of corrosion inhibitors to steam systems; use of titanium in chemical plant; and ways and means of making use of the special properties of silicones. Full particulars can be obtained from the above address.

MACHINERY'S ENQUIRY BUREAU

For many years Machinery has provided an enquiry service not only for subscribers and advertisers but for all engineers in need of such information as the names of makers—or their agents—of machines or equipment for performing particular operations, suppliers of various classes of material, firms with facilities for undertaking certain types of work, owners of trade names, and agents for foreign machine builders. If you have such a problem write (Machinery, Enquiry Bureau, Clifton House, 83-117 Euston Road, London, N.W.1) or telephone (Euston 8441, 2 lines). This service is, of course, entirely free.

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						911
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Trade Publications

E.M.I. ELECTRONICS, LTD., Instrument Division, Hayes, Middlesex.—Abridged catalogue giving specifications and illustrations of the company's range of monitors and probes for use in laboratories and other establishments where radioactive materials are handled.

Curson, Gerrard & Co., Ltd., Oldbury, Birmingham.
—Useful booklet entitled "First Aid Regulations," which
gives information on the latest first aid legislation, together
with descriptions of outfits supplied by the company.

ELECTRICAL REMOTE CONTROL Co., LTD., Bush Fair, Harlow, Essex. Leaflet describing the company's type Star and Star/D automatic self-resetting synchronous timers for industrial control applications which require single-circuit timing.

SAMUEL OSBORN & Co., LTD., Clyde Steel Works, Sheffield, 3.—Leaflet on the company's Titanic facing chuck which provides for screw thread drive and incorporates a quick release mechanism and safety device. Chucks are available with various Morse, B & S, and International taper shanks, for use with screw bore shell end mills of Double Mushet high-speed steel.

ELCONTROL, LTD., Wilbury Way, Hitchin, Herts. Data sheet LR issue 4 is concerned with the company's current range of conductivity type level controllers for conductive liquids and free-flowing solids with adequate moisture content. A recent addition to this range is the type S5

certified intrinsically safe control unit. Various new and improved probe fittings have also been introduced.

GLACIER METAL Co., LTD., Alperton, Wembley, Middlesex.—Designer's Handbooks No. 1, 2, and 3 are concerned respectively with standard bearings supplied from stock, dry bearings and materials, and centrifugal oil filters. Each of these publications includes much useful information conveniently presented. The standard bearing handbook covers wrapped bimetallic bushes; bronze bushes; bronze bars and tubes; white metal bearing ingot; dry (no lubricant) wrapped composite bushes, thrust washers, and strip; dry (no lubricant) composite bars, tubes, and mouldings; "micro clearance" bearings; and film located bearings. Handbook No. 2 is devoted to Glacier DU prefinished composite strip formed into bushes, thrust elements, hemispherical cups, and slides; Glacier DQ bar, tube, and mouldings, for machining into bearings and sliding elements of all kinds; and Glacier DG/DL low friction, low wear surface treatments for journals, thrust faces, and other rubbing elements.

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One of the exhibits on the stand of Sciaky Electric Welding Machines, Ltd., Falmouth Road (Trading Estate), Slough, Bucks., at the forthcoming Engineering, Marine, Welding and Nuclear Energy Exhibition, will be an assembly comprising two ½-in. thick plates and a 1½-in. plate, of mild steel, which have been spot welded on one of the company's latest 3-phase machines. The diameter of the spot welds is 1½ in., and the assembly, which, it is claimed, is representative of the heaviest-duty spot welding yet carried out, draws attention to the fact that exceptionally thick plates can now be handled on Sciaky machines in the field of structural engineering. This exhibit, with another spot welded assembly comprising three pieces of 16 s.w.g. mild steel, is shown in the illustration



Sharing Scientific Equipment

A scheme for sharing scientific equipment between industrial companies in South-East England has recently been announced by the F.B.I. London and South Eastern Region. A large proportion of the 126 industrial firms represented in the Region's Research Directors' Discussion Group have submitted two lists of items of equipment—one of items they are prepared to make available to other companies, and the other of equipment to which they would like to have access. These lists are now being circulated to all members of the Group with the suggestion that "offerers" and "seekers" should make contact with one another direct.

Coming Events

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Institution of Mechanical Engineers. Northern Ireland Branch. April 25, at 6.45 p.m., at Central Hall, Belfast College of Technology; lecture on "Engineering Dimensional Metrology as an Aid to Engineering Production," by Professor J. Loxham.

INSTITUTION OF PLANT ENGINEERS. Merseyside and North Wales Section. April 27, at 7.15 p.m., at The Blossoms, Chester; lecture on "Problems Associated with the Running of a General Engineering Works," by C. J. Wright. Birmingham Section. April 28, at 7.30 p.m., at the Imperial Hotel, Temple Street, Birmingham; lecture on "Fibre Glass Reinforced Plastics," by G. O. Gurney.

Institution of Production Engineers. Lincoln Section. April 27, at 7.30 p.m., at the Ruston Club, Lincoln; lecture on "Some Aspects of Production Engineering," by L. R. Mumford.

New Appointments

The following new appointments have been announced: Dr. A. W. Henderson, Ph.D., B.Sc., as chief chemist/metallurgist of The Plessey Co., Ltd., Ilford, Essex.

Mr. P. Gotley as a director of Electrical Remote Control Co., Ltd., Bush Fair, Harlow, Essex.

Mr. K. J. H. Adams as production manager of the Semiconductor Division of Brush Crystal Co., Ltd., Hythe, Southampton.

Mr. B. J. Harpham as managing director of Collingwood Conveyor Equipment, Ltd., Collingwood Iron Works, 18-22 Northdown Street, London, N.1.

Mr. E. L. TOWNSEND as chairman of Secomastic, Ltd., Western Road, Bracknell, Berks., and Mr. C. G. Tudor Pole as managing director.

Obituary

Mr. A. E. A. McGrath, senior technical representative for Fescol, Ltd., North Road, London, N.7, died suddenly on April 8. He joined the company in 1934, and was successively representative in London, the North of England, Scotland, and the Midlands and South Wales. He was widely known in the engineering industries and had made many friends.

Townsend-Coates, Ltd.

Townsend-Coates, Ltd., is the title of a new company which has been formed by Mr. E. J. Townsend, formerly managing director of Ex-Cell-O Group Sales, Ltd., in conjunction with Mr. W. C. Coates. The address of the company is 167 London Road, Leicester, and it will be developed as a sales and service unit covering electronic equipment and light machine tools. In the former connection, arrangements have been made to develop a market for Timothy Eaton, Ltd., Alderley Edge, Cheshire, whose activities in the applied research field cover a wide range of industrial applications for both electronic and mechanical equipment. In the machine tool field, the company will work with Slack & Parr, Ltd., Kegworth, to further the development and sales of machine tools suitable for drilling, tapping and light milling operations, which have been proved in certain industries, and can now be supplied for hand, semi-automatic, or automatic operation. These machines will be additional to the already well-known geared and gearless, fixed and adjustable centre, multispindle drill heads made by Slack & Parr, Ltd.

Scrap Metals

MIDLANDS.—With the increase in production in the motor vehicle industry Midland merchants are now obtaining increased tonnages of scrap, and prospects of a brighter period of trading appear to be assured. The steelworks want grades No. 1 and 2 heavy steel scrap, also No. 4 bales. More difficult to place are No. 5 bales, as buyers have been experiencing trouble with this class of scrap due to the inclusion of non-ferrous material in the form of attachments to light iron, which is not always evident when the scrap is hydraulically compressed.

Steel turnings, both bushy and chipped, are being moved, but there is no eagerness to accept increased tonnages. Cast iron borings are wanted, and increased prices are being paid for clean dry borings from the machining of cylinder blocks.

Cast iron scrap of all grades finds a ready market, and merchants are ready to accept car and lorry engines for stripping. Local foundries are accepting short heavy steel scrap under allocations, the supplies being equal to all demands.

Light pressing scrap of all grades can be handled at local yards, and the production of bales is now proceeding steadily to meet the demand for 12-in. cubes of light steel, light iron, and destructor material. The dismantling of condemned cars has provided large tonnages of light iron scrap which is loaded from this area for steelworks as specification No. 6 material.

Stamping flash from the drop forges is cleared regularly to steelworks, alloy material being consigned mainly to the Sheffield area.

All prices are fairly stable at present and provided that scrap is properly segregated, and free from "tramp" elements, it is not likely to be refused.

STOCKS OF SCRAP at Steel works and steel foundries at the end of February totalled 1,186,000 tons as compared with 1,269,000 at the end of December.

British Exports of New Machine

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888 (1-18.5) (1-2111) (2-111) (2-111) (1-22.44) (3-12.44) (3-12.44) (4-12.44

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*	Bar and Chucking Automatics			rtical ring hines	Во	ther ring thines		lling hines		cutting hines	Lap and F	iding, ping loning hines	Tu	an and rret thes		ther
Countries	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Valu £
Commonwealth			2 200	57.034		34 030	2 025		1 217	45 133	4 040	127 227	3,295	126 467	6 011	202.4
iouth Africa	_	_	2,308	57,236	(24)	36,938	2,935	66,676	1,217	45,177	(389)	127,237	(79)	126,467	(326)	203,4
ndia ;	928	50,566	3,806	293,586	4,401	245,081	3,985	119,316	651	43,584	5,794 (359)	249,168	10,462	414,384	7,297	226,5
Pakistan	-		(1)	219	171	5,208	348 (50)	8,562	-	-	683	27,169	269	11,187	399	13,26
Australia	2,510	136,848	737		(3) 7,279 (38)	232,204		293,264	(10)	70,499	(265)	430,545	(267)	369,491	(498)	548,8
New Zealand	-	-	(2)	1,142	30 (4)	1,405	(125)	28,020	(1)	2,416	(242)	36,838	(49)	62,735	4,585 (278)	156,9
Canada /	129	7,136	695	17,775	338	13,846	4,235 (153)	90,334	246	13,165	3,197 (206)	131,155	680	32,919	9,779	327,9
Miscellaneous		-	244 (11)	7,232	628 (33)	12,519	2,088 (477)	62,861	-	-	2,250 (346)	80,048	(23)	22,734	8,099 (319)	248,7
Foreign																
Soviet Union			-	-	-	-	-	-	1,671	92,108	(25)	103,652	-	_	-	-
iweden	260	13,871	(1)	95	293	22,799	907	24,109	322	18,631	862	39,328	4,205	206,395	2,283	100,3
Norway	7	-	-	-	-	-	361	5,878	-		(19)	7,379	456	20,887	(70)	15,7
Denmark:	697	35,827	(1)	3,156	40	2,637	648	20,667	53	3,778	(14)	7,636	(40)	73,025	826 (97)	31,9
Western Germany	(3)	4,502	370	14,146	(10)	11,681	367 (80)	8,312	1,519	76,566	(101)	7.	1,696 (42)	68,959	4,904 (287)	192,8
Netherlands	143	13,112	179	3,789	(4)	6,789	(117)	42,010	531	16,111	(80)		3,470 (105)	132,582	(105)	41,8
Belgium	(2)	3,717	95	6,583	36	2,905	802 (87)	24,505	199	11,853	(85)		(34)	49,613	947	39,8
France	2,056	105,157	609	15,633	245	17,176	585	20,675	4,950 (26)	187,415	5,046 (93)	187,712	2,691	128,098	2,290 (157)	105,1
witzerland	-	-	519	12,091	458	22,206	2,648	69,065	28	938	578 (27)	35,603	(123)	94,504	602 (85)	28,2
pain	467	25,260	(3) 43 (1)	4,364	-	-	331	9,565	506	37,098	(35)	66,386	(21)	83,509	59	3,2
taly	2,857	187,026	-		189	13,733	(12)	10,208	265	12,340	2,032	122,093	(16)	51,656	(50)	99,3
J.S. America	2,471	112,673	1,597	52,612	473	19,865	4,921	121,178	987	65,818	7,217 (389)	343,834	(57)	122,643	21,378	687,5
Miscellaneous		65,241	2,070 (20)	64,184	35668 (55)	708,218	7,375	197,288	8,490	317,749	9,956 (1,004)	470,978	4,563 (128)	224,949		543,7
Total	13,650	760,936	13,406	588,842	51,796 (255)	1375210	45,546 (3,28I)	1222493	22,966	1015246	62,957 (3,870)	2729953	54,680 (1,325)	2296737	10282 3	

Total exports of reconditioned machine tools: Quantity: No., 2,149; Weight, 127,100 cwt.; Value, £1,138,717. Total exports of imported machine tools: Quantity: Weight, 16,275 cwt.; Value, £613,424.

British Imports of New Machine

Country of Origin		and king matics	Vertical Boring Machines		Bo	her ring hines		lling hines		cutting hines	Lap and F	nding, ping loning hines	Tu	tan and rret thes	Other Lathes		
	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value	
Sweden	- 1	-	_	_	352 (2)	12,332	451 (50)	9,810	137	5,893	(119)	175,653	-	-	548 (21)	23,450	
Western Germany	1,525 (30)	86,326	2,936 (27)	127,448	(80)	388,513	2,490 (219)	131,476	2,086	132,144	24,830 (727)	1089481	4,991 (175)	347,586	7,450 (359)	350,161	
France	76 (2)	3,815	1,02	46,755	151	11,652	133 (22)	7,164	60 (2)	5,524	(26)	64,223	282	8,963	2,431	85,242	
Switzerland	2,781	270,315	3,690	314,357	(4) 593 (22)	52,790	253	24,381	645	73,606	4,445 (292)	394,869	2,716	256,839	4,535	355,119	
U.S. America	5,848	315,053	(45) 48 (5)	6,692	(22) 2,096 (12)	78,815	2,150	106,779	(104)	632,444	(407)	2408229	2,170	121,351		640,707	
Miscellaneous		30,577	2,573 (22)	129,317	6,522 (58)	213,700	2,516 (86)	51,146	207	12,603	5,234 (239)	242,628	1,410 (26)	37,126	6,695 (543)	220,770	
Total	(221)	706,086	(100)	624,569	19,840 (178)	757,802	7,993 (508)	330,756	13,564 (218)	862,214	60,329 (1,810)	4375083	II,569 (290)	771,865	32,284 (I,28I)	167545	

Total imports of reconditioned machine tools: Quantity: No., 828; Weight, 61,728 cwt.; Value, £1,323,159

Tools and Parts during 1960

ne

Value £

03,441 26,532 3,260 48,865 6,924 27,953 48,719

10,348 5,774 11,946 12,879 11,809 19,802 05,173 18,206 3,289 19,359 87,500 43,784 3615563

ine

Value £

23,450 350,161 85,242 355,119 640,707 220,778

Milling Machines									ving hines	Screwing and Threading Machines		Planing, Shaping and Slotting Machines		Unit Transfer Machines and Heads		Other Machines		Machine Tool Parts*		Total	
Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt.	Value £	Quan tity. Cwt. and No.	Value £		
		2									20 455		7.415	2 445	00 274	F 461	234 020	41 470	1 224 62		
,796 (59)	79,454	3,648 (140)	77,806	4,238	117,170	699 (80)	15,634	(14)	10,568	862 (40)	20,455	(13)	7,415	(241)	98,374	5,461		(2,006)	1,326,07		
(54)	292,451	22,363	583,482	(107)	389,878	585	17,609	590 (33)	40,520	4,943	130,742	(2)	5,853	(470)	417,098	12,032	512,155	(1,586)	4,032,00		
327	14,847	985	18,687	774	14,558	50	1,814	108	5,504	119	2,607	(2)	_	603	24,806	436	25,303	5,274	173,731		
(14)	450,918	(21) 81.819	1683045	5.425	145,942	1,705	41,580	1.879	104,627	5,649	129,188	221	11,080	(20)	443,047	15.821	697,315	(224) 190,213	5,823,45		
229)		(88)		(341)		(46)		(71)		(170)		(3)	233	(363)	40,069	1,283		(3,062)	534,570		
,185 (43)	45,665	(82)	28,956	895 (300)	19,886	574 (69)	13,363	(4)	6,241	867 (36)	21,164	(i)	233	(117)				(1,353)	177		
136)	289,974	978	28,446	3,509	80,935	(33)	12,365	352	23,975	1,068	27,325	-	, -	955 (57)	34,265	1,880	119,649	(1,262)	1,251,217		
(42)	50,785	3,345 (171)	79,173	1,729 (370)	50,675	805 (72)	19,126	(18)	8,529	1,366	30,938	(1)	17	1,671 (268)	59,243	2,751	134,868	27,168 (2,266)	867,467		
_	_		_	525	47,736	_	_	_	_		-	_	_	3,096	132,134	_	_	6,685	375,63		
888	37,836	8,061	165,294	(16)	28,677	40	2,304	601	39,101	_	_	2	848	(68)	118,476	1,084	92,169	(126) 24,925	910,28		
(14)	9,226	(35)	29,669	(5)	3,782	(10)	251	(18)	7,855	97	2,976	(2)	382	(71)	57,510	363	24,825	(445) 4,926	186,39		
(7)		(5)		(5)		(1)	-	(8)		(5)		(2)	302	(32)				(185)			
(5)	8,028	(12)	32,997	166	12,881	(2)	588	300	21,815	(11)	3,021	-	-	(23)	38,698	411	30,093	7,211	326,79		
1,112	81,381	2,428	88,745	1,399	61,769	(2) 79 (12)	9,545	1,350	103,062	474	15,773	-	-	(121)	103,749	2,503	151,481	23,923	1,143,81		
(23)	54,765	(58) 1,617	73,551	1,273	41,712	11	637	192	16,676	249	4,562	-	_	1,336	38,064	776	60,309	15,468	605,19		
(35)	34,397	(33)	35,856	766	29,303	(3)	1,877	(15)	_	(6)	5,410	_	-	(62) 2,260	94,628	1,614	85,473	(621)	479,14		
(15)	118,819	(8) 6,248		(16)		(9) 29		233	18,269	(8) 951	26,992	6	897	(33)	202,414	3,833	246,714	(400) 37,781			
(39)		(52)	119,335	(9)	13,481	(3)	1,329	(10)		(51)		(5)	07/	(77)				(613)	1,515,28		
,723 (34)	86,487	260	16,498	(3)	3,357	(10)	888	(9)	14,042	(6)	829	-	-	462	17,524	1,160	62,160	(367)	464,39		
559	24,641	140	5,670	150	11,421	(10)	-	180	16,366	300	10,926	5	558	876	39,478	904	40,293	7,763	378,82		
(16) 692	36,131	3,138	81,184	1,074	62,611	-20	471	442	37,235	(6)	_	(2)	_	2,005	109,755	888	67,897	(128)	891,69		
(5)	84,245	(33)	46,739	(16) 758	21,597	(5)	3.021	(12)	97,510	556	15,838	3,142	104,740	(66)	81,260	3.887	226,923	(339) 55.748	2.207.9		
(45)	-	(25)		(149)		(5)	-,	(53)	1	(22)		(5)		(175)		-		(2,104)			
5,883 (137)	268,086	(129)	266,671	5,203 (588)	176,822	(113)	24,358	2,280 (73)	195,700	6,923 (221)	192,894	(1)	225	(666)	613,859	7,914	325,769	(4,540)	4,656,77		
44,772 (952)	2068136	152705 (1,046)	3461804	40,064	1334193	5,956 (501)	166,760	10,876 (397)	767,595	24,817 (782)	641,640	3,616 (37)	132,248	73,345	2764451	65,001	3208937	788976	2815074		

Figures in parentheses denote number of machines.

Tools and Parts during 1960

Milling Machines		Presses		Presses		Wo	-metal rking hines		ving hines	Thre	wing nd ading hines	Shapi	ning, ng and cting hines	Tran Maci and h	sfer	Ot Mac	her hines	Mac To Par		Т	otal
Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	.Value	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt. and No.	Value £	Quantity. Cwt.	Value £	Quantity. Cwt. and No.	Value £		
(34) (33,981 (289)	54,459 1057927	531 (10) 25,101 (270)	22,003 711,506	1,070 (45) 9,995 (272)	23,461	30 (5) 3,561 (339)	993 122,047	5 (1) 1,963 (206)	281 122,247	71 (2) 2,113 (47)	2,096 81,405	59 (5)	16,176	1,630 (35) 15,757 (676)	77,480 850,693	489 14,407	556,119	(3.758)	449,626 6,479,39		
,415 (138) 1,026	316,626 545,007	(85) 4,267	144,441	(14) 1,516	46,784	88 (13) 47	3,994	(4) 353	30,088	(2)	3,132 8,605	193	21,634	(205) 1,286	64,616	1,717	140,857 284,853	18,072 (571) 40,051	2,981,71		
(139) (870 (118)	624,925	(50) 17,094 (171)	560,918	(35) 1,678 (170)	210,375	(17) 141 (17)	9,904	(70) 3,296 (294)	299,842	(23) 1,421 (20)	97,459	(4)	-	(244) 14,019 (492)	1,059,161		2049206	(1,486)	9,221,8		
4,436 (243)	513,734	10,402 (216)	194,196	5,778 (187)	183,817	1,700 (240)	44,225	677 (26)	55,824	1,019 (62)	53,753		-	(177)	110,763	7,913	218,884	69,718 (2,138)	2,313,0		
66,993 (961)	3112678	58,940 (802)	1679990	21260 (723)	819,030	5,567 (631)	185,107	6,786	541,141	4,971 (156)	246,450	252 (9)	37,810	35,941 (1,829)	2314353	47761	3291634	415343 (10318)	223320		

Figures in parentheses denote number of machines.

^{*}Not including machine tool cutting parts.

^{*}Not including machine tool cutting parts

Machine Tool Share Market

Stock markets were very active during the period under review, with interest centred mainly in industrial equities, but after displaying an upward trend for the most part, they became irregular and ended on a rather dull note.

The gilt-edged section sustained moderate support, and British funds, together with other high-grade investment stocks, finished with a slight improvement in values.

Buoyant conditions prevailed in commercial and industrial share markets with prices advancing strongly as a result of sustained demand, and despite the fact that leading sections finished in subdued mood, numerous gains were shown on balance.

Among machine tool issues, Abwood Machine Tool advanced 6d. to 1s. 9d.; Asquith Machine Tool, 1s. to 14s.; Brooke Tool, 3s. 6d. to 10s. 9d.; Coventry Gauge & Tool, 4½d. to 31s. 3d.; Greenwood & Batley, 3d. to 26s. 3d.; Alfred Herbert, 4s. to 75s. 6d.; John Holroyd "A," 1s. 9d. to 18s.; John Holroyd "B," 9d. to 16s. 3d.; H. W. Kearns, 6d. to 23s. 3d.; Macready's Metal, 1s. to 17s.; Newall Engineering, 1s. to 11s.; Newman Industries, 6d. to 6s.; W. E. Norton (Hldgs.), 1s. 6d. to 7s. 6d.; Samuel Osborn, 2s. 6d. to 58s.; John Shaw & Sons (Wolverhampton), 2s. 7½d. to 20s. 6d.; W. E. Sykes "B," 7½d. to 30s. 7½d.;

and Tap & Die Corporation, 3d. to 18s. 3d. On the other hand, Edgar Allen lost 3d. at 41s. 6d.; British Oxygen, 6d. at 34s.; Broom & Wade, 7½d. at 28s. 1½d.; Chas. Churchill, 1½d. at 9s. 10½d.; Clarkson (Engineers), 7½d. at 29s. 4½d.; Craven Bros. (Manchester), 1½d. at 11s. 9d.; A. A. Jones & Shipman, 1s. at 47s.; and Kerry's (Gt. Britain), 3d. at 10s. 6d.

Sidney G. Jones Demonstration

Sidney G. Jones, Ltd., 8 Balham Hill, London, S.W.12, will hold machine tool demonstration weeks from April 24 to 28 at Midland Electricity Board, Industrial Showrooms, 247 Chester Street, Aston, Birmingham, 6, and from May 2 to 5 at the London showroom, at the above address. Both will be open from 10 a.m. to 5 p.m. daily. Machines on view will include a type SC2 Giddings & Lewis-Fraser Endomatic spot-facing and centring machine arranged for automatic loading; a type 150 Koepfer gear hobbing machine; an M.31 Ebosa semi-automatic turning machine; a P.200 Ebosa surface milling machine; a Monforts K.A. 200/150 chucking automatic; and a Gratomat machine for deburring gear teeth and profiles with simple and inexpensive grinding wheels.

	Ord	1/-	1/9	Herbert (Alfred), Ltd	-		
Allen (Edgar) & Co., Ltd	Ord				Ord	£I	75 /6
Arnott & Harrison, Ltd	. 5% Prf		41/6	Holroyd (John) & Co., Ltd	"A" Ord	5/-	18/-
Arnott & Harrison, Ltd		£I	13/9*	20 11	"B" Ord	5/-	
Asquith Machine Tool Corp., Ltd		4/-	15/-	20 00	B Org	3/-	16/3
Birmingham Small Arms Co., Ltd	Ord	5/-	14/-	Jones (A. A.) & Shipman, Ltd	0-4		400 /
Birmingham Small Arms Co., Ltd		£i	16/3			5/-	47 /-
i n n	. 6% Cum. Fri.	EI	10/3	99 99 99 ******************************	7% Cum. Prf.	5/-	4/9
		10/-	36/6	Kearney & Trecker-C.V.A., Ltd	51% Red. Cum. Prf.	£I	11/-
	. 5% Cum. "A" Prf.	£I	14/-xd		D (1 O . 1	£I	13/9
	"A" Prf.		1 10	Kearns (H. W.) & Co., Ltd	Ord	5/-	23/3
44 44 57	. 6% Cum. "B" Prf.	Z1	16/6xd	Kerry's (Gt. Britain), Ltd	Ord	5/-	10/6
99 99 99	" B " Prf.		1-7-	Macreadys Metal Co., Ltd	Ord	5/-	17/-
	. 4% Ist Mort.	Stk.	92	Martin Bros. (Machinery), Ltd	Ord	2/-	2/6
11 11 11	Deb.	- ch.	-	Massey (B. & S.), Ltd	Ord	5/-	
British Oxygen Co., Ltd		5/-	34/-	(b. a. o.), Ltd	- · · · · · · · · · · · · · · · · · · ·	3/-	12/-
origini Oxygen Co., Eta		61	20/6	Newall Engineering Co., Ltd	Ord	. 2/-	11/-
Brooke Tool Manufacturing Co., Ltd.	Ord	5/-	10/9	Newman Industries, Ltd	Ord	2/-	6/-
Proom & Wade, Ltd		5/-	28/14	reaman industries, Ltd	6% Prf. Ord.	5/-	5/-
7700m a 7720e, LLu		3/-	ex rights	Noble & Lund, Ltd			
	. 6% Cum. Prf.	£I	ex rights		Ord	2/-	5/6
"(David) Consession Led	54% Cum. Prf.		16/-	Norton, W. E. (Holdings), Ltd	Ord	2/-	7/6
Brown (David) Corporation, Ltd	1 54% Cum. Pri.	[]	17/-	Osborn (Samuel) & Co., Ltd	Ord	5/-	58 /-
Buck & Hickman, Ltd	. 6% Cum. Prf.	£I		- 4" " "	51% Cum. Prf.	£I	23/6
Butler Machine Tool Co., Ltd		5/-	16/104	Pratt (F.) & Co., Ltd	Ord	5/-	16/10
29 89 89	. 5% Cum. Prf.	£I	14/3	Sanderson Kayser, Ltd	Ord	10/-	37/6
Churchill (Charles) & Co., Ltd	Ord	2/-	9/104	. 11 11	61% Cum. Prf.	£I	18/-
10 10 10		£I	25/4+1xd	Scottish Machine Tool Corporation,	Ord	4/-	11/3
Clarkson (Engrs.), Ltd	Ord	5/-	29 /41	Ltd.		,	1-
Cohen (George), 600 Group, Ltd	Ord	5/-	14/-	Shardlow (Ambrose) & Co., Ltd	Ord	£I	55 /74
	. 44% Cum. Prf.	£I	13/	Shaw (John) & Sons, Wolverhamp-	Ord	5/-	20/6
Coventry Gauge & Tool Co., Ltd	Ord	10/-	31/3	ton, Ltd.		-/	-010
				Sheffield Twist Drill & Steel Co., Ltd.	Ord	4/-	19/6
	. 5% Cum.	61	16/3		5% Cum. Prf.	£i	14/3
	. 5% Cum. Red. Prf.	-	/-	Stedall & Co., Ltd	Ord	5/-	8/9
Craven Bros. (Manchester), Ltd	Ord	5/-	11/9	Sykes (W. E.), Ltd	"B" non-	10/-	30 /74
Iliott (B.) & Co., Ltd	Ord	1/-	3/44	-,,	voting Ord.		20114
., .,		£I	12/-	Tap & Die Corporation, Ltd	Ord	5/-	18/3
	Cum. Prf.		1-1	n n n	41% Deb.	Sek.	824
expert Tool & Case Hardening Co.,	Ord	2/-	2/74		1961-1977		OTA
Ltd.		~/	-/- 1	Wadkin, Ltd	Ord	10/-	22/6
irth Brown Tools, Ltd	4% Cum. Prf.	£I	11/-	Ward (Thos. W.), Ltd	Ord	13	77 /6
Greenwood & Batley, Ltd		10/-	26/3	TVAI'U (11105. TV.), ELU	5% Cum.	£i	14/-
received a pariet accommend		101-	20/0	n n	Ist Pref.	EI	14/-
Harper (John) & Co., Ltd	Ord	5/-	8/6		5% Cum.	£I	22/-
	410/ Red	. 61	12/-	39 99	2nd Pref.	21	22/-
1) 1)	Cum. Prf.	4.1	12/-	Willson Lathes, Ltd	Ord	1/-	3/44

The Middle Prices given in the list are in several cases nominal prices only and not actual dealing prices. Every effort is made to ensure accuracy, but no liability can be accepted for any error.

* Sheffield price.

\$ Birmingham price.

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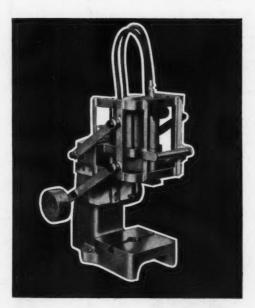
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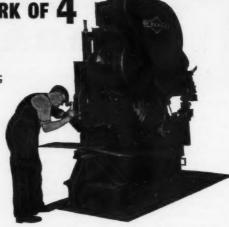
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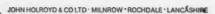
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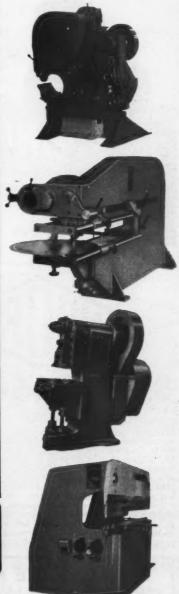
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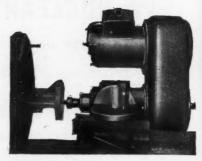
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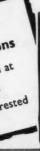
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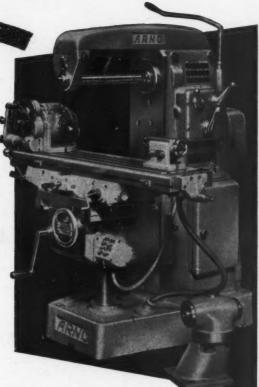
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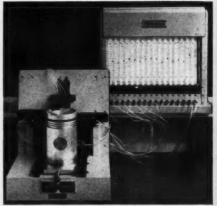
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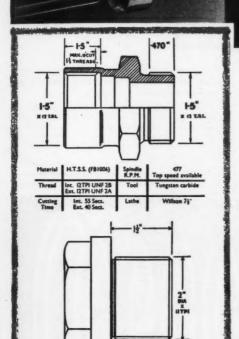
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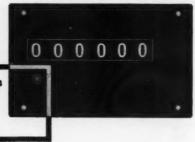
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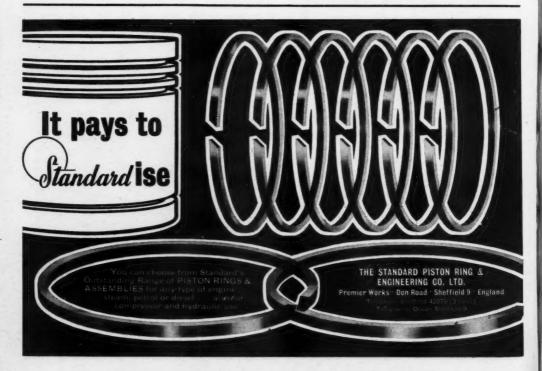
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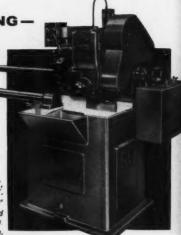
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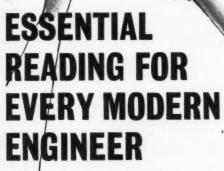
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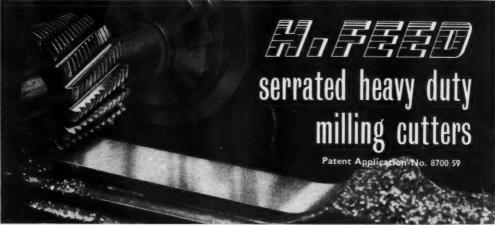


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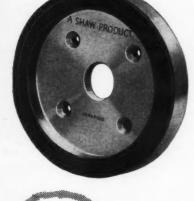


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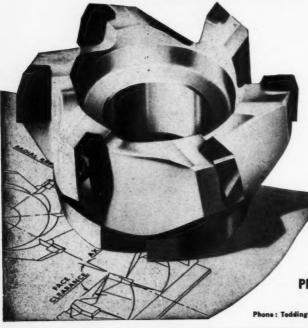
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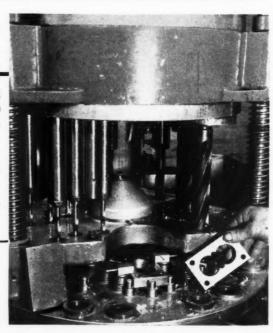
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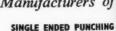
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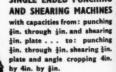
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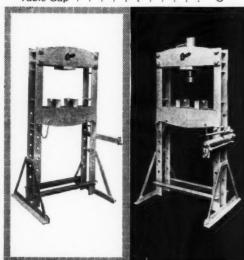
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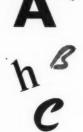
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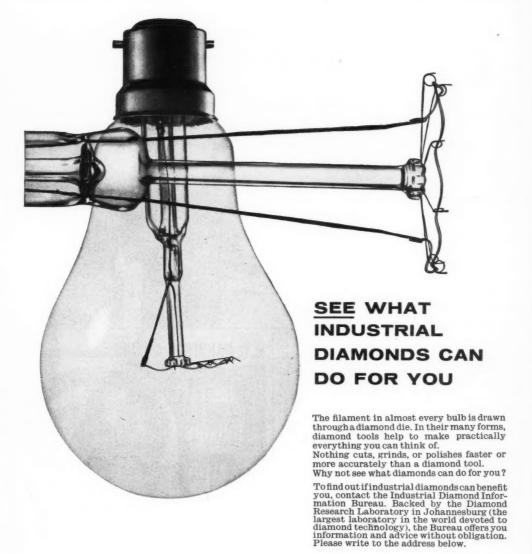
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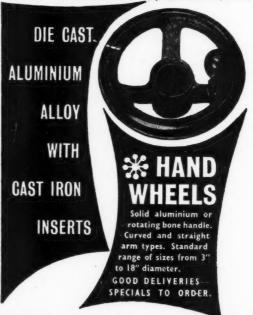
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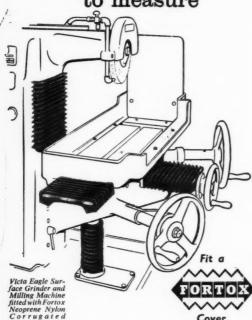
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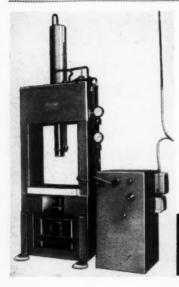
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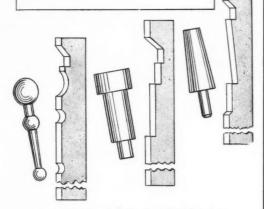
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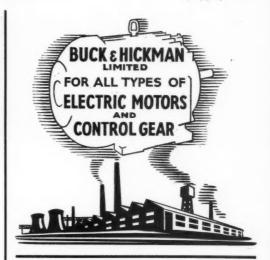
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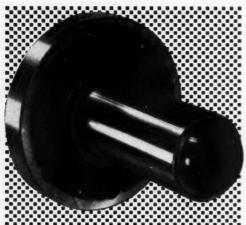
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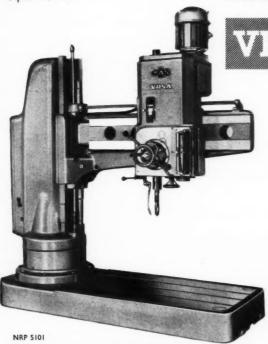
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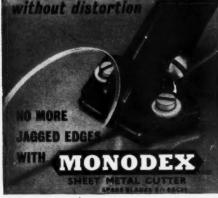
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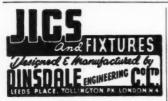
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GRINDING MACHINES
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- HERBERT 14in. Single Spindle Bar Automatic, with equipment.
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- 18in. EDGWICK Plain Horizontal Milling Machine. Table W.S. 26in. by 7in.
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- GISHOLT No. 4 Capstan Lathe, arranged for chucking, 2½in. Hollow spindle.
- TURNER 11 in. Capstan Lathe, with bar feed.
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Lathe, collet capacity 14in., spindle
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MICHIGAN 900 Rack Type Gear Finisher.

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  1 BROWN & SHARPE OOG.
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- Multi Spindle

  I WICKMAN 5 sp. I ĝin.

  4 WICKMAN 5 sp. I ĝin.

  3 B.S.A. GRIDLEY 6 sp. I in.

  2 GRIDLEY 6 sp. † in.

  4 B.S.A. GRIDLEY 4 sp. ĝin.

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  1 CONOMATIC 6 sp. I ĝin.

  I GREENLEE 6 sp. I ĝin.

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- bore Internal I HEALD Internal Model 81

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- 2 ADCOCK & SHIPLEY Rack Feed
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- Vertical

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  62\(\frac{1}{2}\) in. by 15\(\frac{1}{2}\) in.; 18 to 450 r.p.m.

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tons

5 tons.

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250 tons. Max. stroke approx. 14in. Teeslotted bed 19tin. × 28tin. Weight approx. 12 tons.
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KEARNS No. 2 Standard Horizontal Boring Machine with facing head and sliding spindle. 400/3/50.

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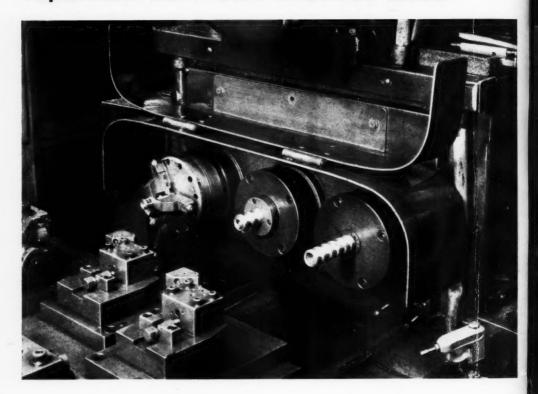








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